2002-06

Naval Academy athletic programs as predictors of midshipmen academic and military performance

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THESIS

NAVAL ACADEMY ATHLETIC PROGRAMS AS PREDICTORS OF MIDSHIPMEN ACADEMIC AND MILITARY PERFORMANCE

by

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June 2002

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REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	June 2002	Master's Thesis

4. TITLE AND SUBTITLE
NAVAL ACADEMY ATHLETIC PROGRAMS AS PREDICTORS OF MIDSHIPMEN ACADEMIC AND MILITARY PERFORMANCE

5. FUNDING NUMBERS

6. AUTHOR(S) Zettler, Gregory M.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Postgraduate School
Monterey CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES: The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

ABSTRACT *(maximum 200 words)*:

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14. SUBJECT TERMS: Naval Academy, Military Performance, Academic Performance, Athletics.	15. NUMBER OF PAGES 82
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)

Prescribed by ANSI Std. 239-18 298-102

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN LEADERSHIP AND HUMAN RESOURCE DEVELOPMENT

from the

NAVAL POSTGRADUATE SCHOOL
June 2002

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This research analyzes the impact of the United States Naval Academy's club sport and varsity athletic programs on midshipman academic and military performance. Linear regression models are developed for the Naval Academy classes of 1998 and 1999 to analyze the effect of explanatory variables on midshipmen Academic Quality Point Rating (AQPR) and Military Quality Point Rating (MQPR). It is important to understand the relationship between athletic programs and academic and military performance so that the Academy leadership can objectively evaluate and maximize the positive effects these programs have on preparing midshipmen to assume the responsibilities that await them upon graduation. The study concludes that sufficient evidence exists to suggest that the United States Naval Academy should continue to foster strong varsity and club sport athletic programs. Beyond the officer-like qualities that are directly taught on the athletic field, significant participation in these programs does enhance the military performance of midshipman. Specifically, MQPR was positively affected when a student-athlete won a letter in either a varsity or club sport. There is also some evidence to suggest that performance in the classroom may benefit as well, but it is not as convincing as in the case of military performance. Specifically, when all valid AQPRs are used in the analysis, AQPR was positively affected when a student-athlete won a letter in either a varsity or club sport. When only graduates were used, however, the significance levels of the coefficients were not above the threshold, and no conclusion could be made regarding the effect of letter winning on AQPR.

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I. INTRODUCTION

> To develop midshipmen morally, mentally and physically and to imbue them with the highest ideals of duty, honor and loyalty in order to provide graduates who are dedicated to a career of naval service and have potential for future development in mind and character to assume the highest responsibilities of command, citizenship and government (U.S. Naval Academy, 2000, Internet).

A. BACKGROUND

The mission of the United States Naval Academy (USNA), which is quoted above, highlights the difficult objective of transforming the young men and women who enter on Induction Day into dutiful, honorable, and loyal naval officers. It correctly asserts that the transition takes more than a focus on academic, or mental, development and it dictates that each midshipman must be developed morally and physically as well. That is because, as John Paul Jones, the father of United States Navy, so aptly put it: "It is by no means enough that an officer of the Navy should be a capable mariner" (Reef Points, 2001, p. 122). Each naval officer must, of course, have the intellectual capability to understand the complexities of the naval service, its wartime and peacetime missions, and the highly technical and diverse platforms used to carry out these missions. This is the modern day equivalent to what was known in John Paul Jones' time as being "a capable mariner." (Reef Points, 2001, p. 122). But the naval leader must also at times act as politician, disciplinarian, technician, and motivator, to name a few. Naval leaders must, in short, be people with a broad range of abilities.

Thus, the Naval Academy is charged with a very different set of responsibilities than civilian colleges and universities. It does not seek to produce specialists in any one field, but endeavors to produce highly adaptable, confident, and capable generalists. Indeed, when the Naval Academy calculates the class standing of its graduates it uses more than academic class scores. It also factors in subjective evaluations of each individual's military performance, physical fitness, participation on athletic teams, and conduct. A midshipman will achieve a high class rank only if he or she excels in each of these areas.

Athletic participation, however, may have an effect greater than its direct input into military performance grades. For example, a midshipman who participates and wins a varsity letter in a multi-seasonal sport can be affected in one of several ways. The athlete may be heavily taxed by the time requirements involved. Practice time (up to five hours a day) and time spent traveling to away games and races can significantly detract from the amount of available study time. Lack of study time will eventually affect the academic performance of even the most capable student-athletes. Conversely, participating in athletics may have benefits. Navy's head crew coach thinks so. He explains: "their [rowers at the Naval Academy] athletic experience is a very substantial element in their undergraduate experience. The opportunities for personal growth are nearly limitless" (Navy Sports Information Center, 1998, p. 4). If athletics develop characteristics in student-athletes such as maturity, stamina, aggressiveness, and goal achievement then, in doing so, they may create enhanced performance both on and *off* the playing field.

In a program of development as intense as the USNA's, time is one of the most precious resources. It is important then, to ask the question: What is the effect of the Naval Academy's athletic programs on midshipmen performance. Does it contribute to the moral, mental, and physical development necessary to create "graduates who are dedicated to a career of naval service and have potential for future development" (United States Naval Academy Information Page, 2000, Internet)? Furthermore, does athletic participation make it more likely that a midshipman will graduate, thereby preserving taxpayer pecuniary investment and Naval Academy time and resource investments?

This thesis explores the relationship between athletic participation and academic and military performance at the USNA. Although the sample group and hypothesis are oriented to this one institution, the study may be more widely applicable. All academic institutions would benefit from understanding how their athletic programs affect student performance.

B. OBJECTIVES

The objective of this thesis is to measure the impact of the USNA's club sport and varsity athletic programs on midshipman academic and military performance. Multivariate

modeling techniques are used to test the hypothesis that both club sport and varsity athletics contribute, in a positive manner, to the success of student-athletes at the Naval Academy.

This study is intended to provide the Naval Academy administration with empirical evidence about the role of athletics on midshipmen performance The analyses are performed first for a collection of all midshipmen athletic letter winners followed by differentiating between club sport and varsity letter winners. Differentiations are also made between team performance sports and individual performance sports. These differentiations are used to determine if there are differences in the effects of club sports versus varsity sports and team performance sports versus individual performance sports.

The national investment in midshipmen attending the United States Naval Academy is significant. An estimated $250,000 (Cohen, 1999) is invested in each graduate. Because of this investment, the Naval Academy's administration must strive to understand how each component of its four-year developmental program contributes to the performance and quality of its graduates. This thesis strives to provide this understanding about the Naval Academy's athletic programs.

C. SCOPE

The scope of this research is limited to midshipmen who entered the Naval Academy classes of 1998 and 1999 on their respective Induction Days. These classes are the only classes for which the entire four-year history of club sport athletic participation is available.

The data for this thesis were compiled from two sources, the USNA's Office of Institutional Research and from the historical paper records of Prof. Jan Dainard, the USNA's Director of Club Sports. [1]

[1] Data manipulation and statistical analysis was performed using Microsoft Excel spreadsheets and SPSS 9.0.

D. ORGANIZATION

This thesis is organized into eight chapters. The next chapter reviews literature regarding the role athletics play in the development of young adults. Chapter III reviews the athletic programs and policies at the USNA. Chapter IV discusses both performance and graduation model development, regression methodology, and hypothesis testing. The data used in the study are presented in Chapter V, while Chapter VI presents and interprets the results of the performance analysis. Finally, Chapter VII offers a brief research summary, policy recommendations, and recommendations for further research.

II. LITERATURE REVIEW

The effect of athletic participation on the participants themselves is a widely debated topic among educational institutions of all types. Some view high school, collegiate, and even middle school competitive athletics as essential to the successful and complete education of our nation's children. To others, however, athletics represent a distraction from classroom, where the real educating is done. Somewhere between these opposing points of view is the premise that athletic competition in the correct format and with the correct emphasis can benefit scholars. In fact, a number of famous and prestigious institutions, such the United States service academies, and foundations, such as the Rhodes Scholarship, assume this stance.

Using existing literature, this chapter endeavors to determine what qualities an educational institution might attempt to instill in its graduates through athletic programs and how to prevent athletic programs from merely becoming a distraction to the academic education of student-athletes. Finally, it is hoped that some light might be shed on whether or not intercollegiate athletic competition interacts with academics and other elements of the college experience.

A. THE LESSONS OF ATHLETICS

Ever since the beginning of athletic competition in the first Olympic games of 776 B.C., the personal characteristics of athletes have been revered. Gary Funk, author of A Balancing Act-Sports and Education explains: "Advocates of sports speak of how sports participation builds character. Athletes develop determination . . .through practice and competition, athletes understand the importance of self-sacrifice, teamwork, self-discipline, and concentration" (1995, p. 11). In fact, many former high achieving athletes have written of how the athletic experience affected their life, most frequently describing a host of positive "American" values. For example, former Seattle Seahawk quarterback Jeff Kemp believes he learned moral lessons, leadership, humility, and perseverance during his high school, collegiate, and pro-football careers (1999, p. 48). Even researchers have shared the lessons of their athletic

experiences and joined the celebration of athletics as teacher of life's lessons. In The Importance of School Sports in American Education and Socialization, Roland Jeziorski offers that he has noticed the many benefits he gained from his participation in co-curricular athletics; these include:

> Bonding with others, identifying and pursuing achievement of goals, learning the meaning of commitment to those goals and to something greater than myself: the team and the honor of the school community. I learned the value of persistence in the face of adversity and defeat, the importance of give-and-take with others, the importance of self-discipline, and that the possibilities for successful human achievement are dramatically increased when individuals join in dedicated spirit with others in a positive and mutual caring effort (1994, p.10)

There is in fact, a wealth of literature extolling the benefits of athletic competition in helping to educate, socialize, and prepare American youth for their adult lives. Interestingly, many of the characteristics that athletics allegedly foster are frequently the subject of military leadership texts and other works that discuss characteristics of highly capable military leaders. Stogdill found that the average leader exceeds the average member of the group being led in a number of factors including: sociability, initiative, persistence, self-confidence, cooperativeness, and adaptability (1948, p. 63). These same traits surface in discussions about the virtues of athletic competition with exceptional regularity. Perhaps this is why competition on the athletic gridiron is often likened to combat on the battlefield and why intercollegiate athletic competition is so important not only at our country's national service academies, but at all colleges and universities.

B. WHAT CAN GO WRONG

For some, however, intercollegiate athletics are viewed in a significantly less positive light than described above. It is not hard to see why. The volume of media coverage concerning the academic and behavioral failings of student-athletes far outweighs the coverage of those that successfully balance athletic competition and class work. In fact, Sullivan reports (as cited in Long and Caudill, 1991) that the National Collegiate Athletic Association (NCAA) was so concerned about the growing criticism of college athletics that it funded a $1.75 million

study in 1989 and enacted a number of new recruiting rules to reemphasize the student in the term "student-athlete."

Tellingly, the negative depictions of collegiate athletics typically surround high stature, revenue producing sports such as basketball and football. Since the best way for an athletic program to significantly increase its earnings is to garner a berth in a college bowl game and/or the NCAA basketball tournament or to be successful enough to garner a lucrative television contract, one wonders whether money, and the resultant focus on winning in these programs, corrupts the positive effects collegiate athletics can instill in student-athletes. Funk reports that "Critics of college sports believe this pressure to earn money by winning causes coaches to break the rules and downplay academics" (1995, p. 70). Even the student-athletes feel this pressure. They report that their coaches and athletic staffs have a "must-win" attitude and a general disregard for student-athlete academic pursuits as long as the student-athlete meets eligibility requirements to play (Funk, 1995).

Such an obsessive drive to win is incompatible with any effort to utilize athletics as an additional development tool in the education of college students. When student-athletes are allowed to forget that they are first and foremost students, many of the benefits outlined above go lost on student-athletes who cannot maximize the potential that a strong academic education combined with he lessons of the athletic field are intended to give them.

C. PREVIOUS RESEARCH

A study conducted in 1991 by Michael Maloney and Robert McCormick seems to support the hypothesis suggested in the previous section (1992). Their study evaluated the extent intercollegiate athletic participation affects academic success by examining the senior class enrolled at Clemson University during the 1998-1999 academic year. They found that participating in sports mildly reduces academic success, although the effect was not homogeneous across all sports. When the various sports were broken down, only the revenue earning sports, football and basketball, showed significantly negative coefficients. Athletes in other sports earned grades that were nearly identical to their peers.

D. CHAPTER SUMMARY

Our review of the effect of athletic participation on the participants reveals that a collegiate athletic program can enhance the education of students without necessarily affecting their academic performance. When revenue generation is decoupled from the athletic experience, the student-athletes benefit from both athletic competition and from learning in the classroom. If winning or revenue generation gain too much emphasis, however, the resultant and often overwhelming pressure from coaches and peers can significantly detract from the student-athlete's ability to fully exploit the potential of the collegiate experience. Those colleges and universities that manage this balance well will continue to graduate student-athletes that have maximized the educational experience of their students. Those that do not are doing their student-athletes a significant disfavor.

III. UNITED STATES NAVAL ACADEMY POLICIES

Two levels of intercollegiate athletic competition exist at the USNA, varsity and club sports. There are significant differences between the two programs in terms of funding, eligibility for participation, and requirements demanded of the participants. Both programs, however, are designed to ensure that all midshipmen have the opportunity to participate in competitive athletic competition. Together these programs make up one of the most extensive intercollegiate sports programs in the nation. The USNA's former Director of Athletics, Mr. Jack Lengyel, describes the focus of these programs:

> At the Naval Academy, the athletic program is not just an extracurricular activity, it is part of the mission and as such receives a priority much different than at a civilian school. The athletic teams are an integral part of the overall education of a total person. Athletics can provide leadership opportunities and the experience of team play, cooperative effort, commitment and individual sacrifice for goals (U.S. Naval Academy, 1999, p. 135).

A. VARSITY ATHLETICS

Varsity athletics are administered by the Naval Academy Athletic Association, which was chartered to "promote, influence, and assist in financing the athletic contests of the midshipmen of the United States Naval Academy in accordance with the policies of the Superintendent of the Academy" (Navy Sports Information Center, 1999, p. 16). Eighteen men's teams, nine women's teams, and three co-ed teams make up the USNA's varsity athletic program (U.S. Naval Academy, 1999, p. 133). The 1999 Navy Football Guide reports that the funds required to accomplish the NAAA objectives are obtained through admissions fees charged for intercollegiate athletic contests, television appearances by Navy teams, dues and gifts from members of the NAAA, and from interest on invested funds (Navy Sports Information Center, 1999, p. 16). Available varsity sports are summarized in Table 3.1.

Table 3. 1 Varsity Sports Teams

Men's Varsity Sports Teams:		
Baseball	*Gymnastics*	*Squash*
Basketball	*Lacrosse*	*Swimming*
Crew, Heavyweight	*Lightweight Football*	*Tennis*
Crew, Lightweight	*Rifle (Co-ed)*	*Track, indoor*
Cross Country	*Intercollegiate Sailing (Co-ed)*	*Track, outdoor*
Football	*Offshore Sailing (Co-ed)*	*Water polo*
Golf	*Soccer*	*Wrestling*
Women's Varsity Sports Teams:		
Basketball	*Intercollegiate Sailing*	*Track, Indoor*
Crew	*Soccer*	*Track, Outdoor*
Cross Country	*Swimming*	*Volleyball*

1. Varsity Eligibility Requirements

Midshipmen members of athletic teams, extracurricular activities (ECA), or other groups that leave the confines of the Naval Academy for any organized activity, are authorized to do so via a movement order. Movement orders are submitted by a designated Officer Representative and must be approved by the Commandant of Midshipmen. The Director of Athletics determines eligibility requirements for all varsity movement orders guidelines (U.S. Naval Academy, 1999). His requirements are more restrictive than the National Collegiate Athletic Association's (NCAA). The requirements for varsity athletic participation are as follows (D. Davis, personal communication, May 29, 2000):

- Freshmen (4/c Midshipmen) must have a GPA of 1.5 or higher.
- Sophomores (3/c Midshipmen) must have a GPA of 1.75 or higher.
- Juniors (2/c Midshipmen) must have a GPA of 1.85 or higher.
- Seniors (1/c Midshipmen) must have a GPA of 1.95 or higher during the fall semester and 2.0 or higher during the spring semester.

What may set the Naval Academy apart from other non-service academy institutions is that a naval officer, whose sole responsibility is professional development, closely observes each midshipman. These naval officers, called Company Officers, recommend

whether or not the athlete is permitted to travel. Thus, they can help to properly steer midshipman student-athletes to focus on academics over athletics if necessary. The Deputy Commandant of Midshipmen may override the Company Officer, but does so infrequently. He may also waive the Naval Academy's more restrictive standards for travel, allowing a student-athlete who does not meet the USNA requirements, but does meet the NCAA requirements, to travel (U.S. Naval Academy, 1999).

2. Varsity Intramural and Drill Exemptions

An athletic team at the USNA is considered to be "in-season" when it is in a competitive season or is preparing for a competitive season as published in the yearly issue of COMDTMIDN NOTICE 1710. In-season varsity athletes are exempt from intramurals and drill. "Out-of-season" varsity athletes are required to participate in both drill and intramurals. Therefore, in-season varsity athletes may practice or compete on any weekday between the hours of 3:30 p.m. and 7:00 p.m. They may also practice with their teams between the hours of 5:30 a.m. and 7:00 a.m. if, based on the last available marking period, they have a grade point average greater than 2.15. If a student-athlete does not meet this criterion, it may be waived if the midshipman receives approval of his or her Battalion Officer. As a result of these rules, athletes who are "in-season" at the Naval Academy are able to fully utilize the 20 hours a week of practice and competition permitted by the NCAA (D. Davis, personal communication, May 31, 2000). Athletes who are "out-of-season" are much more limited in practice time and must shoulder the additional time burdens required by both drill and intramurals.

3. Varsity Coaching Staffs

USNA varsity coaching staffs are salaried employees of either the NAAA or the Naval Academy's Physical Education Department. They are responsible for all aspects of administering and coaching their respective varsity athletic team. Midshipmen are not usually involved in the administration of the team and are therefore free to concentrate on their athletic performance. Varsity sports teams may appoint a midshipman as a manager to assist the coaching staff with the administrative burden, but this person is not typically also a member of

the competitive squad. Club sport athletes, on the other hand, must take much more responsibility for the day-to-day operations of their team than do varsity athletes.

4. Varsity Athlete Admissions Policies

The USNA's admissions process is extremely complex. The first step is to fill out and return a Pre-Candidate Questionnaire. This questionnaire provides the Office of Admissions with basic academic, demographic, and extracurricular activity information about each candidate. If the applicant meets the standard, the applicant is given a candidate number for tracking purposes and is sent an application package (U.S. Naval Academy, 1999). At this point the applicant is formally designated a "candidate." The information provided in the application package, combined with data forwarded from the candidates' high school, the college testing services, and interviews with Naval Academy Information Officers[2], are compiled and used to calculate the Candidate Multiple. The Candidate Multiple provides a baseline for comparison of the candidates for an incoming class (N. Pantelides, personal communication, March 17, 2000).

In some select cases, a "candidate of special interest" may receive additional consideration in the admissions process. High school athletes who are recruited by Naval Academy varsity coaches constitute one type of "candidate of special interest." For example, a recruit may be assigned "candidate" status despite being slightly below the standard used for non-recruits. Additionally, the Associate Director of Athletics for Admissions, Academics, and Compliance, who is a member of the USNA's Admissions Board, may recommend to the Board that points be added or subtracted to a recruit's Candidate Multiple. Points are only added or subtracted if the Board feels the candidate exhibits characteristics that were not captured by the application process and must be approved by the entire Admissions Board. It is important to note, however, that all candidates for admission to the USNA, whether or not a recruited athlete, may have their Candidate Multiple adjusted up or down if the Admissions

Board feels the candidate exhibits characteristics that were not captured by the application process.

B. CLUB SPORTS

There are a total of 15 club sport teams at the USNA: five men's teams, four women's teams, and six co-ed teams. Club sports are administered by a part of the Naval Academy's Physical Education Department which is charged with accomplishing one-third of the Naval Academy's mission: "to prepare midshipmen physically to become professional Navy and Marine Corps officers" (U.S. Naval Academy, 2000, Internet). The club sport program provides midshipmen the opportunity to participate in intercollegiate sports that are not at a varsity level. They obtain financial support from the Midshipman Welfare Fund (MWF). The MWF exists to:

"Promote and regulate spending of non-appropriated funds to support Brigade educational and recreational activities." It obtains funds from the profits of the Midshipman Store, alumni contributions, and interest. The club sports offered at the Naval Academy are shown in Figure 3.2.

Table 3. 2 Club Sports Teams

Men's Club Sports Teams:		
Boxing	*Lacrosse*	*Volleyball*
Hockey	*Rugby*	
Women's Club Sports Teams:		
Lacrosse	*Softball*	*Tennis*
Gymnastics		
Co-ed Club Sports Teams:		
Combat Pistol	*Judo*	*Pistol*
Cycling	*Karate*	*Power Lifting*

[2] Naval Academy Information ("Blue and Gold") Officers provide a nationwide network of trained individuals who can counsel candidates on all aspects of the Naval Academy.

1. Club Sport Travel Eligibility Requirements

A club sport athlete must meet stringent requirements to compete outside the grounds of the Naval Academy. The midshipman must meet the following minimum standards to be considered eligible for all team movement orders:

- A cumulative and semester grade point average of at least 2.0
- No academic grades of "F" or more than one "D"
- Not on military performance probation or deficient in Physical Education
- "C" or better on the most recent Physical Readiness Test (PRT), a test used to gauge the fitness level of all naval personnel.
- Not considered overweight by the USNA standards.
- Company Officer Approval.

Additionally, no movement orders are allowed during any 6-week, 12-week, or final examination periods. Movement orders that infringe upon class time or nightly study hours (7:30 p.m.-12:00 a.m.) are strongly discouraged and must receive special approval from the instructors of any missed classes, Academic Dean, and Deputy Commandant of Midshipmen (U.S. Naval Academy, 1999). These requirements are significantly more stringent than those previously outlined for varsity athletes.

2. Club Sport Intramural and Drill Exemptions

Club sport athletes are not exempt from attending military drill, parades, or practice parades. They may be considered in-season, and therefore exempt from competing in company intramural competition, for two of the three annual intramural seasons. Club sport athletes must participate in company intramural sports when they are not exempt. (U.S. Naval Academy, 1998). Thus, weekday practice or competitions for in-season club sports may only occur from 3:30 p.m. until 7:00 p.m. on days when there is no drill, parade, or parade practice (U.S. Naval Academy, 1998). On average, there are two drill sessions, parades, or parade practices a week so the average in-season club sport athlete can only spend approximately 11 hours during each in-season workweek practicing or competing.

3. Club Sport Coaching Staffs

The Club Sports Program Handbook explains: "Most club coaches are either volunteer or nominally paid individuals who donate their time and services because of a genuine love and interest in promotion and perpetuation of a particular sport" (Dainard, 1999, p. 9). Ideally, the midshipmen involved in the club sport handle all facets of the sport's administration, including administering a budget, securing funding, scheduling contests, and arranging for travel. This unburdens the coaching staff, allowing them to concentrate only on workouts, game strategy, and guidance, while providing a challenging leadership and management opportunity for the midshipmen. Managers are not utilized. As a result, club sport athletes must act in the role of player-manager. Similar responsibility is not usually afforded to midshipmen participating in varsity athletics.

4. Club Sport Athlete Admissions Policies

Prospective club sport athletes must follow the standard admissions process. In general, they do not receive any special consideration.

C. CHAPTER SUMMARY

Both club sport and varsity athletes experience the developmental benefits of competitive athletics. Varsity athletes, however, receive more support in their athletic endeavors than do club sport athletes. This chapter details that, for varsity athletes, lower standards are used in determining eligibility for participation, more time is allotted for practice and competition, and administrative details are taken care of by varsity coaches and dedicated managers. However, participating in varsity athletics represents a greater intensity of competition and time commitment, which significantly affects the time and energy available to focus directly on improving academic or military performance.

Club sport athletes, on the other hand, are not as well supported and, as a result, must take care of most administrative details themselves. This presents a leadership and management opportunity not available to varsity athletes. Club sport athletes also incur an

additional time commitment, which, although it is less than varsity athletes, is more than non-athletes.

Despite the additional time commitments, the Naval Academy's athletic programs are squarely focused on providing an additional venue to prepare midshipmen for the duties that await them upon graduation, and not merely on winning athletic contests. Relative to those who do not participate in varsity or club sport athletics then, it is hypothesized that the benefits of intercollegiate athletic competition described in Chapter II outweigh the detrimental effect of the increased time commitment, which many athletes have learned to cope with during their high school years. Elements of character such as initiative, persistence, self-confidence, cooperativeness, and adaptability, when reinforced on the athletic field and decoupled from a focus on winning and revenue generation, should bolster a student-athlete's performance in the classroom and in other venues off the athletic field. Therefore, varsity and club sport athletes should experience greater academic and military performance.

IV. MODEL DEVELOPMENT

A. THEORETICAL MODEL DEVELOPMENT

This thesis evaluates the effect of the Naval Academy's athletic programs on midshipman academic and military performance. As a result, three important matters must be addressed. First, measures of midshipman performance must be specified. Since the mission of the Naval Academy is to "develop midshipmen morally, mentally, and physically" (United States Naval Academy Information Page, 2000, Internet), the measures utilized should evaluate development in each of these areas. The USNA utilizes an Order of Merit to create a comprehensive and cumulative ranking of midshipman performance. An individual midshipman's Order of Merit is based upon his Aggregate Multiple, which is a weighted average of the following: academic and professional course grades, physical education grades, athletic performance grades, military performance grades, and conduct grades. These five areas are collected under two different performance measurements: the Academic Quality Point Rating (AQPR) and the Military Quality Point Rating (MQPR). The AQPR captures the academic performance of each midshipman in all academic and professional courses. The MQPR captures performance in areas deemed directly representative of military skills, knowledge, and standards. These include professional courses, physical education, athletic performance, military performance, and conduct. Therefore, both the AQPR and MPQR are used as measures of midshipman performance in the follow-on analysis.

Secondly, a measure of athletic participation must be developed. One method of determining athletic participation is to make use of the membership rosters for each sport. These rosters are maintained by the coaches of varsity sports and by the midshipmen presidents of club sports. Using membership rosters, however, does not allow an evaluation of the degree of participation. For example, since club membership rosters are updated infrequently, a midshipman leaving the sport after only a few practices may still be counted as a participant, but would have minimally participated in competition, practices, and other team activities. As a result, using membership rosters as a measure of athletic participation is not desirable. An

alternative method of determining athletic participation is to use the criteria of letter winning, which is more formalized. In order to win a club sport or varsity letter, a midshipman must meet explicit criteria designed around the specific sport. A women's lacrosse player, for example, must play in 75 percent of the games (for at least 20 minutes of each game) in order to win a club sport letter (Dainard, 1999). Such criterion allows for an evaluation of the degree of participation. Varsity or club sport letter winners will have participated in a significant number of competitions, practices, and team interactions. Consequently, letter winning is used as the measure of athletic participation.

The third issue to be addressed is the determination of variables, beyond athletic participation, that are likely to affect midshipmen performance. Mathew Reardon's 1997 thesis presents a comprehensive analysis of demographic and admissions variables that have an effect on the likelihood of a midshipman graduating. His study found several demographic and admissions variables to be statistically significant. These data form the base of this study's "Graduation" model. Variables describing letter winning are included in addition to a variable describing personality type, which is believed to influence the likelihood of graduation. Since graduation is, to a large degree, a measure of successful performance at the Naval Academy, it is assumed that factors found to have an effect on graduation will also affect academic and/or military performance.

B. EMPIRICAL MODEL DEVELOPMENT

The USNA performance models utilize two groups of explanatory variables: demographic variables and USNA admissions variables. Also, since the purpose of this study is to evaluate the effect of the Naval Academy's athletic programs on performance as measured by AQPR and MQPR, variables representing significant participation in these athletic programs are added to the model. As a result, the USNA performance models capture the effects both USNA selectivity and athletic participation on academic and military performance. The models are specified as:

Academic Performance: AQPR = ¦ (Demographic Variables, USNA Admissions Variables, Varsity and/or Club Sport Letter Winning)

Military Performance: MQPR = ¦ (Demographic Variables, USNA Admissions Variables, Varsity and/or Club Sport Letter Winning)

These models will be further specified and evaluated in Chapter VI.

1. Regression Methodology

This study utilizes Ordinary Least Squares (OLS) regression methodology to estimate the academic and military performance models. First, an initial model is specified. Then, after the independent variables are evaluated for significance, multicollinearity, and strategic importance, an alternate specification is derived. When the models are specified in their final form, athletic participation variables are inserted to assess their impact on academic and military performance.

2. Hypothesis Testing

This study explores the relationship between significant participation in USNA athletic programs and Naval Academy academic and military performance. Although it is expected that lettering in USNA athletic programs have a positive effect on both academic and military performance, the null and alternative hypotheses for academic and military performance are as follows:

$$\mathbf{H_0:}\ b_{\text{LETTER-WINNING}} = \mathbf{0}$$
$$\mathbf{H_A:}\ b_{\text{LETTER-WINNING}} \neq \mathbf{0}$$

This null hypothesis gives the value (equal to zero) that the coefficients of variables describing letter winning are expected to take if lettering in an athletic program *does not* have any impact on an individual's academic or military performance. The alternate hypothesis states that there is a relationship between the explanatory variable and the dependent variable, in other words, that letter winning *does* affect performance. Furthermore, we expect that the coefficients of

variables describing letter winning will be positive. Thus, after evaluating the results of the regressions performed in Chapter VI, the null hypothesis can be rejected, and our predictions verified, if the coefficients of variables describing letter winning are positive and significantly different from zero. Otherwise, the null hypothesis cannot be rejected and we cannot confirm or deny our expectation that athletic participation positively impacts performance. Because the alternative hypothesis is on both sides of the null hypothesis, "Two-tailed tests" are used to determine the significance of the coefficients resulting from the regressions (Studenmund, 1997).

V. THE DATA

A. DATA FIELD DESCRIPTION

The database used in this study is compiled from two key sources. The data sets obtained from these sources were merged to complete the database used for the analysis of the Naval Academy classes of 1998-1999.

The Naval Academy's Office of Institutional Research provided the demographic, admissions, and varsity-lettering data utilized in this study. Data regarding club sport letter winners was provided by the Naval Academy's Physical Education Department.

The Director of the Club Sport Program, Professor Jan Dainard, provided historical paper records of club sport letter winners during the academic years 1995-1999. This information was tabulated and merged with the primary database obtained from the Office of Institutional Research. The resultant database contains demographic, admissions, and performance information for 2198 midshipmen who were inducted in either the class of 1998 or 1999.

B. DEMOGRAPHIC VARIABLES

The first group of explanatory variables in the statistical models include the personal demographics of each midshipman and are summarized in Table 5.1. The *MINORITY* ethnic/racial group variable is coded as a binary variable designating each midshipman as either a minority (*MINORITY* = 1 if the midshipman is African American, Hispanic, Asian American, Native American, Filipino, Puerto Rican, or other non-Caucasian) or as a non-minority (Caucasian). *FEMALE* is a binary variable that describes each midshipman's gender (*FEMALE* = 1 if the midshipman is female).

The binary variables *MILFAM, PRIORMIL,* and *MILPREP* are defined in an effort to capture the effects of military socialization, which should help the midshipman quickly adjust to the Naval Academy environment and enhance both academic and military levels of performance. *MILFAM* identifies whether or not the midshipman was raised in a military family.

These data were obtained by evaluating the midshipman's nomination source. *MILFAM* = 1 if the midshipman received a Presidential nomination (son or daughter of career or retired military), or if he or she received a nomination as the result of being the son or daughter of a deceased/disabled veteran, prisoner of war, or Medal of Honor recipient. *PRIORMIL* = 1 if the midshipman served on active or reserve duty as an enlisted soldier, sailor, airman, or marine in any of the military branches (Army, Navy, Air Force, or Marine Corps). *MILPREP* = 1 if the midshipman attended any of the Naval Academy sponsored military prep schools. These include: Naval Academy Preparatory School (NAPS), Naval Academy Foundation prep schools, or the Navy's Broadened Opportunity for Officer Selection and Training (BOOST) program. In addition to capturing the effect of military socialization, *MILPREP* also captures the effect of post secondary education in a military environment.

As previously noted, the Naval Academy actively recruits talented high school student-athletes to support its varsity athletic programs. Additionally, it seems reasonable to assume that if a midshipman candidate is a recruit, he or she would be viewed as a "candidate of special interest" and would be more likely to receive special consideration and have points added to his or her candidate multiple. This allows a candidate with less academic or military aptitude, but who still meets Naval Academy requirements, to gain admission. The binary variable *RECRUIT* describes midshipmen who are recruited athletes (*RECRUIT* = 1 if the midshipman was recruited by the USNA coaching staff).

For years the Naval Academy has collected information regarding personality type for each midshipman. Several recent articles have explored the implications of these data, indicating that personality type might be an important factor in determining whether or not a midshipman is capable of withstanding the rigors of the Naval Academy (Thompson, 1998). For this reason, personality-typing data are included in the analysis. To examine the effect of personality type on performance, the binary variable *EorISTJ* is created to denote all midshipmen who, when tested during plebe summer, were determined to have the personality types of ESTJ or ISTJ. These personality types are based on the Myers-Briggs Type Indicator,

and are the ideal personality types for midshipman candidates.[3] In this personality typing system, ESTJ stands for Extraverted, Sensing, Thinking, and Judging. ISTJ stands for *Introverted*, Sensing, Thinking, and Judging (Myers, 1993). People with these personality types are logical decision makers, focus on facts, are decisive, and are "results-oriented." It seems reasonable that people with these personality traits might be more often attracted to the Naval Academy and should fare well in its rigorously competitive environment.

Table 5. 1 Demographic Variables.

Variable	Description of Code	Percentages
MINORITY	1 = Minority, 0 = Caucasian	20.6%
FEMALE	1 = Female, 0 = Male	15.6%
MILFAM	1 = Military Mother or Father, 0 = Non-Military Family	46.2%
PRIORMIL	1 = Prior Active Duty Enlisted, 0 = Other	20.2%
MILPREP	1 = Military Sponsored Prep School, 0 = Other	23.2%
RECRUIT	1 = Recruited Athlete, 0 = Other	28.0%
EorISTJ	1 = ESTJ or ISTJ Personality Type, 0 = Other	39.8%

C. USNA ADMISSIONS VARIABLES

The second group of explanatory variables contains data used by Naval Academy's Office of Admissions to evaluate each midshipman's level of preparation. It uses the seven variables summarized in Table 5.2 to construct each applicant's Candidate Multiple, which is a baseline for likelihood of success in the challenging and rigorous Naval Academy environment. *SATmHI* and *SATvHI* are continuous variables with a range between 200 and 800. They represent each midshipman's highest score on the math and verbal SAT, respectively, and are reported to Admissions by the College Testing Service.

CLASSRNK is a continuous variable with a range between 200 and 800. The Naval Academy Admissions Office derives this score from an applicant's high school class rank and class size or, if class rank and size are not reported, from the applicant's high school grade point average (GPA).

[3]For more information on the Myers-Briggs Type Indicator, see Meyers, Isabel Briggs. (1993) Introduction

Each applicant's high school English and Math teacher is asked to fill out a questionnaire evaluating the student. The Naval Academy Admissions Office derives a standardized score, on a scale of 0 to 1000 from these evaluations. The continuous variable *REC* captures the scores from these teacher recommendations.

Each candidate reports a summary of high school Extra-Curricular Activities (ECAs), both athletic and non-athletic, to the Naval Academy Admissions Office. This summary is used to compile a composite score based on the amount and level of participation. For example, an applicant participating in several ECAs is assigned a higher score than an applicant participating in only one ECA. Additionally, participating as the president or team captain of a high school club or athletic team results in a higher score than simply being a member. The score is represented as a continuous variable, ranging from 300 to 800, called *COMPECA*.

Military career interest (*CIS*) and technical interest (*TIS*) are continuous scales derived from the Strong-Campbell Interest Inventory (SCII), a commercially available career guidance instrument. Items from this instrument are used to gauge each applicant's interest in a military career (*CIS*) or technical curriculum (*TIS*).

Table 5. 2 USNA Admissions Variables

Variable	Description of Code	Means and Standard Deviations
SATmHI	Average Math SAT Score (200-800)	***M*** = 656.24, ***SD***=63.31
SATvHI	Average Verbal SAT Score (200-800)	***M***=560.45, ***SD***=75.74
CLASSRNK	Multiple for High School Class Rank and Size (200-800)	***M***=569.98, ***SD***=105.04
REC	High School Teacher Recommendation (0-1000)	***M***=878.44, ***SD***=81.29
COMPECA	Composite ECA Score (300-800)	***M***=556.79, ***SD***=70.18
CIS	Career Interest Survey (Linear scale with a mean of 500)	***M***=497.36, ***SD***=96.13
TIS	Technical Interest Survey (Linear scale with a mean of 500)	***M***=494.82, ***SD***=93.29

to Type. (5th ed.). Palo Alto, CA: Consulting Psychologists Press, Inc.

D. USNA PERFORMANCE VARIABLES

The final explanatory variables, *VARSLTR* and *CLUBLTR,* depict whether or not a midshipman won a letter in a varsity or club sport. *VARSLTR* = 1 if a midshipman won a Naval Academy varsity letter in at least one varsity sport. *CLUBLTR* = 1 if a midshipman won a club sport letter in at least one club sport.

Three additional binary variables are created to allow a more rigorous analysis of the effect of athletics on academic and military performance. The variable *LTRWIN* is created to evaluate the effect of participating in any Naval Academy athletic program. *LTRWIN* = 1 if a midshipman won a club letter, a varsity letter, or both. The variables *TEAMSPRT* and *INDVSPRT* were created to assess the effect of sports that require team performance, such as football (*TEAMMSPRT* = 1), instead of individual performance (*INDVSPRT* = 1), such as boxing. Table 5.3 identifies team sports and individual sports.

Table 5. 3 Classification of Sports as Team or Individual

Sport	Team Sport	Individual Sport	Sport	Team Sport	Individual Sport
Baseball	XXX		*Outdoor Track*		XXX
Basketball	XXX		*Pistol*		XXX
Boxing		XXX	*Power lifting*		XXX
Combat Pistol		XXX	*Rifle*		XXX
Crew	XXX		*Rugby*	XXX	
Cross Country		XXX	*Sailing, Intercollegiate*	XXX	
Cycling		XXX	*Sailing, Offshore*	XXX	
Football	XXX		*Soccer*	XXX	
Golf		XXX	*Softball*	XXX	
Gymnastics		XXX	*Squash*		XXX
Hockey	XXX		*Swimming,*		XXX
Indoor Track		XXX	*Tennis*		XXX
Judo		XXX	*Volleyball*	XXX	
Karate		XXX	*Water Polo*	XXX	
Lacrosse	XXX		*Wrestling*		XXX

AQPR and *MQPR*, which provide the principle measures of midshipman performance, are used a dependent variables in the models. *AQPR* is a continuous variable for the cumulative grade point average for all of a midshipman's academic courses on a 4.0 scale. *MQPR* is the cumulative grade point average for all elements that relate to a midshipman's suitability for military service. These include military performance, professional development courses, physical education, and conduct. As in the case of *AQPR*, *MQPR* is a continuous variable measured on a 4.0 scale. All USNA performance variables are summarized in Table 5.4.

Table 5. 4 USNA Performance Variables

Variable	Description of Code	Percentages, Means, and Standard Deviations
VARSLTR	1 = Varsity Letter Winner, 0 = Other	22.1%
CLUBLTR	1 = Club Sport Letter Winner, 0 = Other	7.8%
LTRWIN	1 = Letter Winner in a Club and/or Varsity Sport	29.5%
TEAMSPRT	1 = Letter Winner in a Team Performance Sport	18.7%
INDVSPRT	1 = Letter Winner in an Individual Performance Sport	11.0%
AQPR	Academic Quality Point Rating (0.0 – 4.0)	***M***=2.75, ***SD***=0.71
MQRP	Military Quality Point Rating (0.0 – 4.0)	***M***=3.06, ***SD***=0.52

VI. PERFORMANCE ANALYSIS

A. USNA PERFORMANCE SAMPLE AND INTIAL ANALYSIS

As discussed in Chapter V, the database used to analyze the effects of participation in Naval Academy athletic programs includes demographic and admissions information for all midshipmen in the classes of 1998 and 1999. The database contains information about the makeup of the classes on Induction Day, the first day of plebe summer, through graduation and has 2,198 observations and 21 variables. The continuous variables for Academic Quality Point Rating (*AQPR*) and Military Quality Point Rating (*MQPR*) are used as the dependent variables for the performance models analyzed here.

The following graphs allow a preliminary analysis of the data used in the performance models. When analyzing academic performance only 2,139 observations are used. This is because 59 midshipmen left the Naval Academy prior to completion of the first semester. Thus, the midshipman was never assigned an AQPR. When analyzing the military performance data, only 2172 observations are used. This is because 28 midshipmen left the Naval Academy prior to the completion of plebe summer, and no MQPR was ever assigned.[4]

In Figures 6.1 and 6.2, above average academic performance (*AQPR*) and military performance (*MQPR*) are cross tabulated with each demographic variable to show the percentage of midshipmen in each demographic that were above average. USNA admissions variables are shown in Figures 6.3, 6.4, 6.5, and 6.6 by determining if each midshipmen was above or below the mean, for a specific variable, and cross tabulating the result with above average *AQPR* and *MQPR*, respectively. This allows an evaluation of whether or not midshipmen with above average SAT scores, class rank, recommendations, composite ECA scores, and SCII scores tend to have above average *AQPR* and/or *MQPR*.

[4] Sample selection bias, if it occurs, is likely to be small because of the small number that left prior to completion of the first semester.

Figure 6.7 shows the results of cross tabulating above average *AQPR* with the athletic participation variables *VARSLTR, CLUBLTR, LTRWIN*, *TEAMSPRT* and *INDVSPRT*. Figure 6.8 illustrates the results of cross tabulating above average *MQPR* with the same athletic participation variables as in Figure 6.7. Therefore, Figures 6.7 and 6.8 portray the percentage of midshipmen participating in the Naval Academy's athletic programs who achieve better than average AQPR and MQPR, respectively.

Figure 6.1 Midshipmen with *AQPR*>Mean by Demographic Group

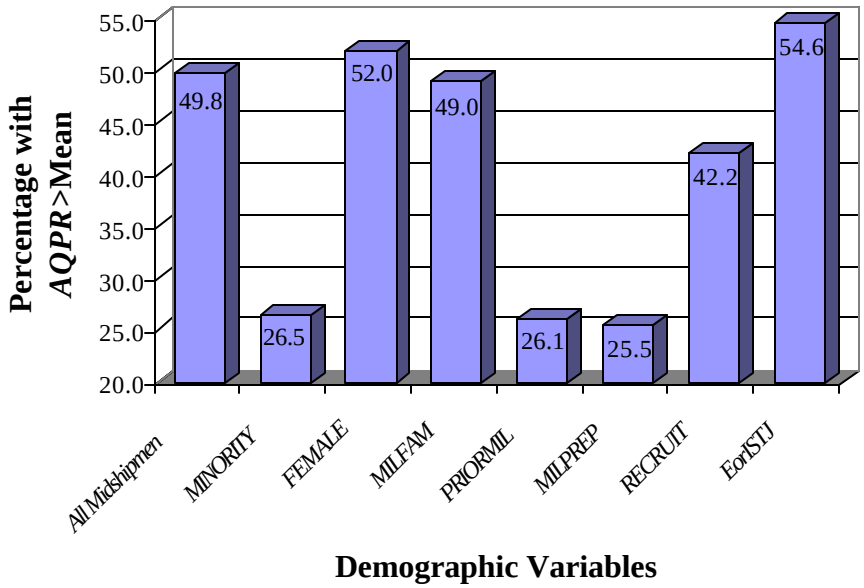
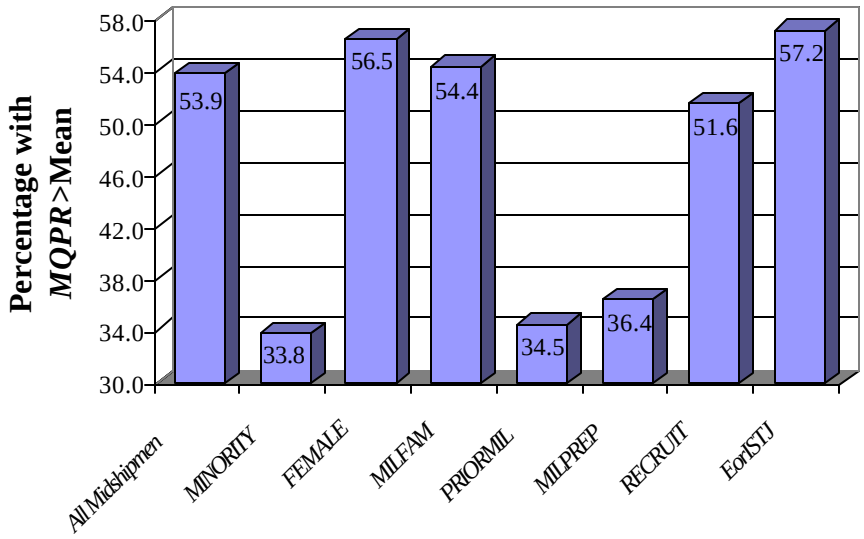


Figure 6.1 shows that a higher percentage of female midshipmen and midshipmen with ESTJ or ISTJ personality types achieved above average *AQPR*s. Minorities, males, midshipmen from military families, prior enlisted midshipmen, midshipmen who attended USNA sponsored military prep schools, recruited athletes, recruited athletes and midshipmen who do not have ESTJ or ISTJ personality types achieved above average *AQPR*s at a lower rate. This suggests that the coefficients β_{FEMALE} and $\beta_{EorISTJ}$ might be positive, while $\beta_{MINORITY}$, β_{MILFAM}, $\beta_{PRIORMIL}$, $\beta_{MILPREP}$, and $\beta_{RECRUIT}$ might be negative. These results are interesting because the discussion in Chapter V would suggest that β_{MILFAM}, $\beta_{PRIORMIL}$, and $\beta_{MILPREP}$ should be positive due to an increased level of military socialization allowing early and more complete adaptation to the rigors of the Naval Academy. Because of this hypothesis, the expected coefficient signs of

the academic performance model's USNA demographic variables remain: $\beta_{MINORITY}$ (-), β_{FEMALE} (+), β_{MILFAM} (+), $\beta_{PRIORMIL}$ (+), $\beta_{MILPREP}$ (+), $\beta_{RECRUIT}$ (-), and $\beta_{EorISTJ}$ (+). It will be interesting, however, to compare this finding with the results of the multivariate analysis, which will hold other variables constant when examining the effect of each of these demographic variables on the relevant dependent variable, and the results of the "total effect," which is represented in Figure 6.1.

Figure 6. 2 Midshipmen with *MQPR*>Mean by Demographic Group



With the exception of midshipmen from military families, the cross tabulation results for above average *MQPR* versus demographic group parallel those of above average *AQPR* versus demographic group. Figure 6.2 illustrates that female midshipmen, midshipmen from military families, and midshipmen with ESTJ or ISTJ personality types achieve above average *MQPR* scores more frequently than the sample average. Minority midshipmen, prior enlisted midshipmen, midshipmen who attended Naval Academy sponsored military prep schools, and recruited athletes tended to achieve above average *MQPR* scores at a lower rate than did the sample. Once again, these results are somewhat surprising since the suggestion that the coefficient signs of $\beta_{PRIORMIL}$ and $\beta_{MILPREP}$ should be negative runs counter to earlier discussion. Their military experience should give them some advantage. Thus, it will be interesting to see the independent effect of these variables in the multivariate analysis as compared to the total

effect depicted in Figure 6.2. To summarize, the initial expectation of the coefficient signs of the military performance model's USNA demographic variables are as follows: $\beta_{MINORITY}$ (-), β_{FEMALE} (+), β_{MILFAM} (+), $\beta_{PRIORMIL}$ (+), $\beta_{MILPREP}$ (+), $\beta_{RECRUIT}$ (-), and $\beta_{EorISTJ}$ (+).

Figures 6.3, 6.4, 6.5, and 6.6 suggest that, in terms of the percentage of midshipmen with an above average AQPR and/or MQPR, the data fields selected by the Naval Academy's Office of Admissions accurately establish a measure of a candidate's potential for strong academic and military performance. With the exception of Technical Interest Survey (TIS) scores, midshipmen scoring above the mean for each of the USNA admissions variables achieved, as a group, an above average AQPR and MQPR at a higher rate than the Naval Academy average. Midshipmen scoring below the mean for each of the USNA admissions variables achieved an above average AQPR and MQPR at a rate that is lower than the USNA average. Midshipmen with above average TIS scores, however, achieved above average AQPR and MQPR grades less frequently than the sample average. Based on the fact that TIS scores are used to predict success at the USNA, it will be interesting to compare the total effect presented in the figures below with the independent effect of these variables in the multivariate analysis. Predicted coefficient signs in the AQPR and MQPR models remain: β_{SATmHI} (+), β_{SATvHI} (+), $\beta_{CLASSRNK}$ (+), β_{REC} (+), $\beta_{COMPECA}$ (+), β_{CIS} (+), and β_{TIS} (+).

Figure 6. 3 Midshipmen with *AQPR*>Mean by Admissions Variable

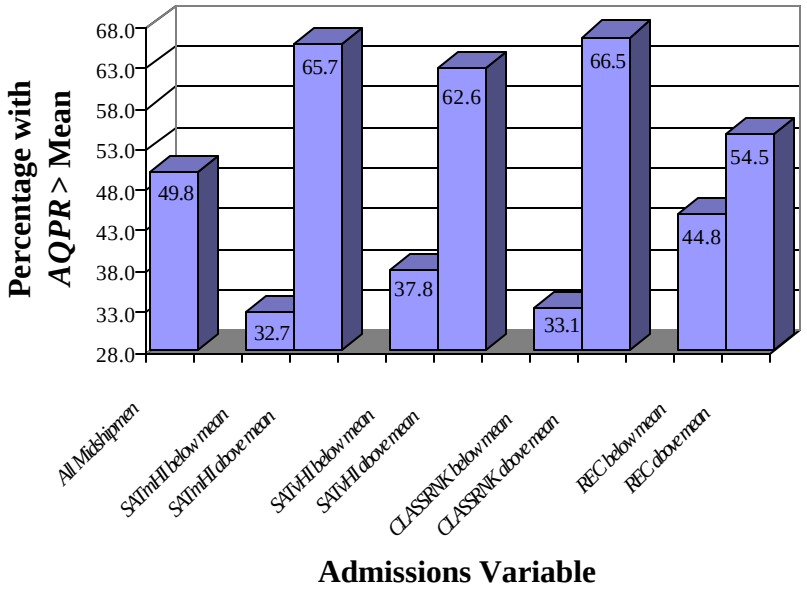


Figure 6. 4 Midshipmen with *AQPR*>Mean by Admissions Variable

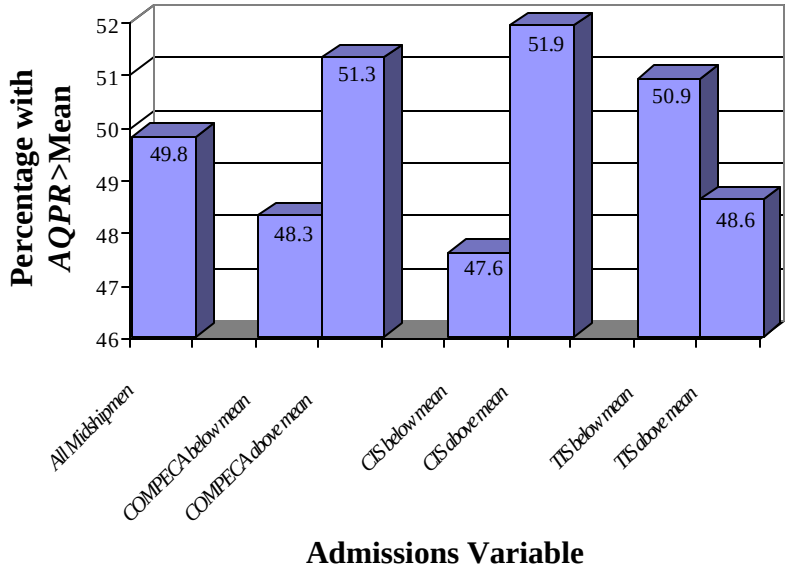


Figure 6. 5 Midshipmen with *MQPR*>Mean by Admissions Variable

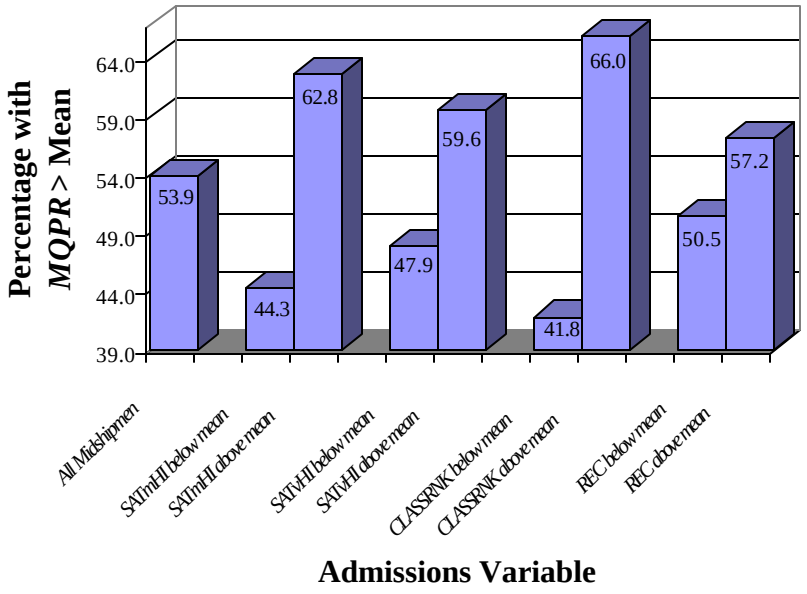


Figure 6. 6 Midshipmen with *MQPR*>Mean by Admissions Variable

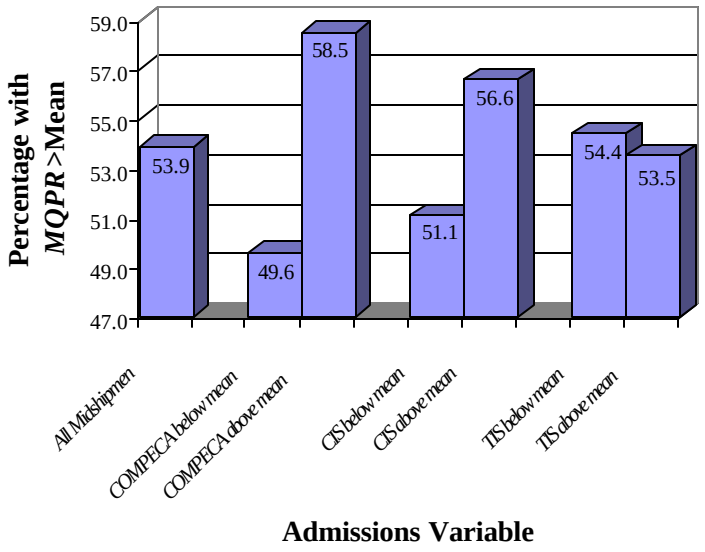
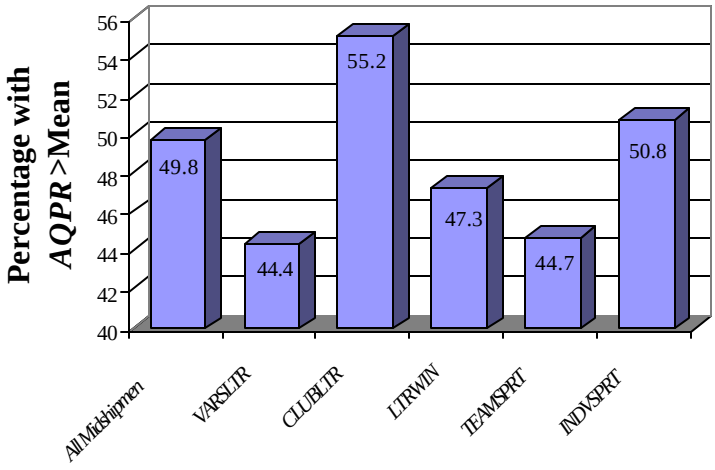


Figure 6.7 indicates that the combined total effects of athletic participation on academic performance are negative for varsity letter winners, letter winners as a whole, and team sport letter winners. The hypothesis, however, is associated with a multivariate analysis in which all

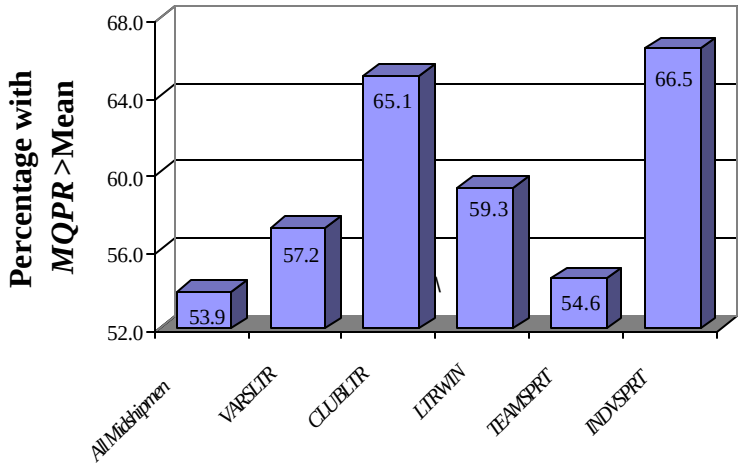
other variables are held constant. In each of these cases, midshipmen achieved above average AQPR grades at a lower rate than the USNA average. Thus, it will be interesting to see the independent effect of these variables in the multivariate analysis. All other athletic participation variables appear to agree with our proposed hypothesis. The expected signs for the coefficients in the academic performance model remain: $\beta_{VARSLTR}$ (+), $\beta_{CLUBLTR}$ (+), β_{LTRWIN} (+), $\beta_{TEAMSPRT}$ (+), $\beta_{INDVSPRT}$ (+).

Figure 6. 7 Midshipmen with *AQPR*>Mean by Athletic Participation



Finally, Figure 6.8 shows that athletic participants, whether participating in varsity, club, team, or individual sports, achieved above average MQPR grades at a rate higher than the USNA average. Therefore, in keeping with the hypothesis established for the military performance model, the coefficient for each of these variables is expected to be positive: $\beta_{VARSLTR}$ (+), $\beta_{CLUBLTR}$ (+), β_{LTRWIN} (+), $\beta_{TEAMSPRT}$ (+), $\beta_{INDVSPRT}$ (+).

Figure 6. 8 Midshipmen with *MQPR*>Mean by Athletic Participation



B. USNA PERFORMANCE MODEL DEVELOPMENT

1. Initial Performance Model Specifications

Now that the sample population, explanatory variables and their expected signs, and dependent variables have been described, the regression models can be specified. After the initial models are evaluated, an alternate model will be proposed. The final step is to utilize the alternate specification to assess the effect of athletic participation on academic and military performance. The proposed initial models for academic and military performance are specified below:

Initial Academic and Military Performance Models:

$$AQPR \text{ or } MQPR = \alpha_0 + \beta_{MINORITY}MINORITY + \beta_{FEMALE}FEMALE + \beta_{MILFAM}MILFAM + \beta_{PRIORMIL}PRIORMIL + \beta_{MILPREP}MILPREP + \beta_{RECRUIT}RECRUIT + \beta_{EorISTJ}EorISTJ + \beta_{SATmHI}SATmHI + \beta_{SATvHI}SATvHI + \beta_{CLASSRNK}CLASSRNK + \beta_{REC}REC + \beta_{COMPECA}COMPECA + \beta_{CIS}CIS + \text{and } \beta_{TIS}TIS$$

These models are used to analyze the effect of demographics and USNA admissions variables on academic and military performance and will be applied to the database in two different ways. First, an analysis will be conducted using only those midshipmen who graduated from the USNA. These are the only midshipmen for whom a complete set of data is available, allowing a comprehensive evaluation of four years of effort. In the second analysis, the academic performance of all midshipmen is included unless they left prior to the completion of their first semester or, for the military performance model, prior to the completion of plebe summer. Obviously, there are no valid data for the dependent variable AQPR and MQPR, respectively, when departure meant no academic or military grades could be assigned. Because the second analysis includes people who were dismissed from the Naval Academy due to substandard academic or military performance, the results may prove interesting despite not providing a comprehensive analysis of four years of effort.

2. Results of the Initial Performance Models

a. Initial Performance Model (Graduates-only)

Table 6.1 shows the results of the initial academic and military performance OLS models when only midshipman who ultimately graduated from the Naval Academy are used in the analysis. In the academic performance model, all variables except *MILPREP*, *RECRUIT*, and *CIS* are statistically significant at the 0.10 level of significance or lower. Based on the F statistic results of 74.20, the null hypothesis of zero explanatory power is rejected at a significance level of lower than 0.0001, and it is concluded that the model does have significant explanatory power.

In the military performance model, only *MINORITY, RECRUIT, EorISTJ, SATmHI, SATvHI, CLASSRNK*, *REC*, and *TIS* are statistically significant at the 0.10 level or lower. Once again, the F-statistic result of 33.897 allows us to reject the null hypothesis of zero

explanatory power to a significance level of lower than 0.0001. Therefore, we can conclude that the initial military performance model does have significant explanatory power.

Table 6. 1 OLS Parameter Estimates for Initial Performance Models (Graduates-only)

	Academic Performance Model			**Military Performance Model**		
Variable	**Coefficient**	**t**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	.22903	1.187	.2353	**1.67688**	**11.641**	**.0000*****
MINORITY	**-.14326**	**-5.874**	**.0000*****	**-.10450**	**-5.738**	**.0000*****
FEMALE	**-.05378**	**-2.054**	**.0401**	-.02161	-1.105	.2691
MILFAM	**-.04120**	**-2.301**	**.0215**	-.00162	-.121	.9038
PRIORMIL	**.09004**	**2.744**	**.0061**	-.01451	-.592	.5537
MILPREP	-.04452	-1.442	.1494	.00258	.112	.9109
RECRUIT	.03337	1.553	.1206	**.04491**	**2.799**	**.0052**
EorISTJ	**.04013**	**2.174**	**.0298**	**.04095**	**2.971**	**.0030**
SATmHI	**.00217**	**11.699**	**.0000*****	**.00069**	**5.013**	**.0000*****
SATvHI	**.00067**	**4.669**	**.0000*****	**.00032**	**2.964**	**.0031**
CLASSRNK	**.00163**	**15.980**	**.0000*****	**.00083**	**10.855**	**.0000*****
REC	**.00028**	**2.446**	**.0145**	**.00026**	**3.017**	**.0026**
COMPECA	**-.00039**	**-2.853**	**.0044**	.00016	1.595	.1109
CIS	.00015	1.546	.1223	**.00013**	**1.743**	**.0814**
TIS	**-.00026**	**-2.486**	**.0130**	-.00003	-.440	.6598
F-statistic	**74.200**	-	**.0000*****	**33.897**	-	**.0000*****
	n = 1810, Adjusted R^2 = 0.362			n = 1810, Adjusted R^2 = 0.203		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

b. Initial Performance Models (All Valid AQPRs and MQPRs)

Table 6.2 shows the results of the initial academic and military performance OLS models when all midshipmen with valid AQPRs and MQPRs, respectively, are used in the analysis. This analysis includes people who were dismissed from the Naval Academy due to substandard academic or military performance and may prove interesting despite not providing the same comprehensive analysis of four years of effort that an analysis using only graduates does. All midshipmen are included unless they left prior to the completion of their first semester for the academic performance model or prior to the completion of plebe summer for the military

performance model. In these cases there are no valid data for the dependant variable *AQPR* and *MQPR*, respectively (no academic or military grades were assigned).

In the academic performance model, all variables except *PRIORMIL*, *MILPREP*, *RECRUIT*, and *CIS* are statistically significant at the .10 level of significance or lower. Based on the F-statistic results of 79.799 the null hypothesis of zero explanatory power is rejected to a significance level of lower than 0.0001, and it is concluded that the model does have significant explanatory power.

All variables except *FEMALE*, *MILFAM*, *PRIORMIL*, *MILPREP*, *COMPECA*, and *TIS* are found to be significant, at the .10 level of significance or lower, in the military performance model. The model is considered to have significant explanatory power based on the F-statistic result of 33.897 (significance level of lower than 0.0001).

Table 6. 2 OLS Parameter Estimates for Initial Performance Models (All Valid MQPRs and AQPRs)

	Academic Performance Model			**Military Performance Model**		
Variable	**Coefficient**	**t**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	-.23179	-1.101	.2711	**1.49594**	**9.066**	**.0000*** **
MINORITY	**-.19052**	**-7.317**	**.0000*** **	**-.14626**	**-7.180**	**.0000*** **
FEMALE	**-.05818**	**-2.041**	**.0414**	-.01604	-.719	.4723
MILFAM	**-.03721**	**-1.888**	**.0592**	.00588	.380	.7038
PRIORMIL	.03376	.935	.3498	**-.06514**	**-2.300**	**.0216**
MILPREP	-.00190	-.055	.9560	.03328	1.239	.2153
RECRUIT	.03749	1.589	.1121	**.04716**	**2.545**	**.0110**
EorISTJ	**.05375**	**2.634**	**.0085**	**.03198**	**1.997**	**.0459**
SATmHI	**.00239**	**11.896**	**.0000*** **	**.00086**	**5.489**	**.0000*** **
SATvHI	**.00064**	**3.981**	**.0001**	.00017	1.339	.1808
CLASSRNK	**.00179**	**16.038**	**.0000*** **	**.00093**	**10.662**	**.0000*** **
REC	**.00050**	**3.957**	**.0001**	**.00042**	**4.268**	**.0000*** **
COMPECA	**-.00037**	**-2.519**	**.0118**	.00005	.447	.6549
CIS	.00013	1.202	.2294	**.00014**	**1.660**	**.0970**
TIS	**-.00030**	**-2.570**	**.0102**	-.00009	-1.032	.3022
F-statistic	**79.799**	-	**.0000*** **	**36.109**	-	**.0000*** **
	n = 2139, Adjusted R^2 = 0.340			n = 2172, Adjusted R^2 = 0.185		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

3. Alternate Performance Model Specifications

There is a significant multicollinearity issue to be considered with the previous model estimations; *MILPREP* and *PRIORMIL* have a high Pearson correlation coefficient (r = 0.702). This is expected since the *MILPREP* variable captures graduates of the Navy's BOOST program and NAPS, both of which are in existence to develop the academic skills of enlisted military members who are otherwise qualified for NROTC or Naval Academy admission. Both variables are also moderately correlated with *SATmHI, SATvHI* and *CLASSRNK*. Table 6.3 gives a matrix of the Pearson correlation coefficients and the corresponding significance between these variables. A negative correlation between these variables is expected since *MILPREP* and *PRIORMIL* are correlated, and *MILPREP* captures primarily midshipmen who are considered academically unqualified to be directly admitted to the USNA. Since the primary measures of academic qualification are admissions variables, it is not surprising that three of them are moderately correlated with both *MILPREP* and *PRIORMIL*. The issue of multicollinearity will be a key consideration in determining the specification of the alternate academic and military performance models.

Table 6. 3 Key Pearson Correlation Coefficients for Initial Model Specification

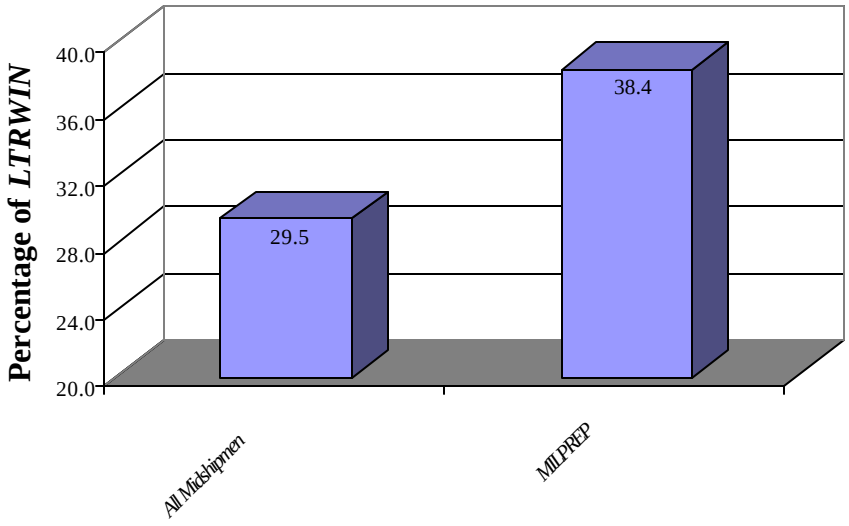
		SATmHI	*SATvHI*	*CLASSRNK*
MILPREP	Pearson's Correlation Coefficient	**-0.456**	**-0.353**	**-0.406**
	Significance (two sided)	**0.000*** **	**0.000*** **	**0.000*** **
PRIORMIL	Pearson's Correlation Coefficient	**-0.411**	**-0.370**	**-0.376**
	Significance (two sided)	**0.000*** **	**0.000*** **	**0.000*** **

Note: **Bold** indicates significance lower than .10 (two-tailed test)
*** Significance lower than .0001

Although the initial model results found *MILPREP* to be insignificant, *MILPREP* may be a strategic variable since midshipmen who attended a Naval Academy sponsored military prep school tended to earn a varsity letter, club sport letter, or both more frequently than those who did not. Figure 6.9 shows this graphically. The difference is partially explained by the fact that a large percentage (36.7 percent) of midshipmen who attended Naval Academy sponsored

military prep schools, especially NAPS and the USNA Foundation prep schools, are recruited athletes who are otherwise qualified, but not academically qualified, for admission to the USNA. Thus, it may not be possible to drop *MILPREP* from our initial specification. To evaluate the effect of dropping *MILPREP* from each of the initial analysis, all other variables found to be insignificant in the initial estimation are removed, and the athletic participation variable *LTRWIN* is included. If, after a regression is run on this model, *MILPREP* is still insignificant and the model retains explanatory power it can be concluded that *MILPREP* is not important to this analysis. It may then be left out of the alternate specification.

Figure 6. 9 Percentage of *LTRWIN* for All Midshipmen and for *MILPREP*



a. Alternate Performance Model Specifications (Graduates-only)

When considering a simplified specification for the academic performance model with only graduates included in the analysis, *RECRUIT* and *CIS* are not included based on a review of their strategic importance (estimated to be low) and their lack of statistical significance. *MILPREP*, while insignificant in the initial model might, however, be important and is tested as described above. The result of the regression is tabulated in Appendix A. The goodness of fit between the initial model specification and the tested specification, as determined

by the adjusted coefficient of determination (Adjusted R^2), stays approximately the same (.362 to .361). *MILPREP* continued to be marginally insignificant (t = -1.559, Sig. = 0.119) and the F-statistic reveals that the model retains explanatory power (F = 79.627, Sig. < 0.0001). Therefore, it is concluded that *MILPREP* is not an important variable and the alternate academic performance model specification for the graduate only analysis is:

$$AQPR = \alpha_0 + \beta_{MINORITY}MINORITY + \beta_{FEMALE}FEMALE + \beta_{MILFAM}MILFAM + \beta_{PRIORMIL}PRIORMIL + \beta_{EorISTJ}EorISTJ + \beta_{SATmHI}SATmHI + \beta_{SATvHI}SATvHI + \beta_{CLASSRNK}CLASSRNK + \beta_{REC}REC + \beta_{COMPECA}COMPECA + \beta_{TIS}TIS$$

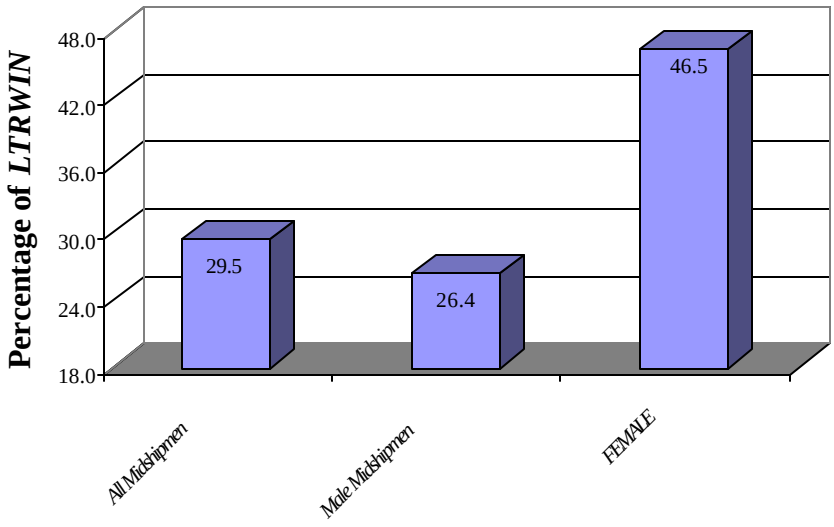
An alternate specification for the military performance model (only graduates) is obtained similarly. *MILFAM, PRIORMIL, COMPECA*, and *TIS*, are evaluated as unimportant and, based on the initial model results, are not statistically significant. Therefore, they are not included in the alternate specification. The variables *FEMALE* and *MILPREP*, however, are not statistically significant, but may be strategically important.

MILPREP's importance was tested as described above. The results are tabulated in Appendix A. In terms of goodness of fit, a comparison between the initial model specification and this model specification indicates an increase in the adjusted R^2 from 0.203 to 0.216. Once again, however, *MILPREP* remains statistically insignificant (t = -.459, Sig. = 0.646), while the F-statistic allows us to accept the alternative hypothesis that the model does have explanatory power (F = 50.819, Sig. < 0.0001). Therefore, it is concluded that *MILPREP* is not an important variable in the military performance model for this analysis. It will not be included in the alternate model specification.

FEMALE may be a strategically important variable because females tend to earn varsity letters, club sport letters, or both at a much higher rate both males and the USNA average. Figure 6.10 illustrates this. The difference is explained by the greater opportunity for athletic participation offered to females at the USNA. For example, of the 30 varsity sport programs, nine are women's teams. Of the 16 club sport teams, four are women's teams and

six are co-ed. Thus, 41 percent of the USNA's sports teams are open to women even though women only constitute 15.6 percent of the classes of 1998 and 1999.

Figure 6. 10 Percentage of *LTRWIN* for All Midshipmen and for *FEMALE*



To evaluate the importance of *FEMALE* in a simplified military performance model (graduates-only), a regression was run after including *LTRWIN*, but following the removal of the other unimportant and insignificant variables in the initial model (*MILFAM*, *PRIORMIL*, *MILPREP*, *COMPECA*, *TIS*). The results are tabulated in Appendix A and show that *FEMALE* is an important variable. *FEMALE* becomes statistically significant (t = -1.861, Sig. 0.063), while the F-statistic continues to indicate that the specification has significant explanatory power (F = 51.236, Sig. < 0.0001). The adjusted R^2 for this model increases from 0.203 in the initial model to 0.217 for our test of FEMALE, indicating a better model fit. Therefore, inclusion of *FEMALE* is important and will be included in the alternate military performance model.

The alternate military performance model for the graduate only analysis can now be specified as:

$$MQPR = \alpha_0 + \beta_{MINORITY}MINORITY + \beta_{FEMALE}FEMALE + \beta_{RECRUIT}RECRUIT + \beta_{EorISTJ}EorISTJ + \beta_{SATmHI}SATmHI + \beta_{SATvHI}SATvHI + \beta_{CLASSRNK}CLASSRNK + \beta_{REC}REC + \beta_{CIS}CIS$$

b. Alternate Performance Model Specifications (All Valid AQPRs and MQPRs)

A review of the results of the initial academic performance model when all midshipmen with valid AQPRs are included in the data set shows that all variables except *PRIORMIL*, *MILPREP*, *RECRUIT*, and *CIS* are significant. Of the four variables that are insignificant, *PRIORMIL*, *RECRUIT*, and *CIS* are not included in the alternate specification based on a review of their strategic importance (estimated to be low) and their lack of significance. As in the graduate only analysis, however, *MILPREP* may have importance and is evaluated similarly. The results of a regression of the initial model with all insignificant variables except *PRIORMIL* removed and *LTRWIN* added are tabulated in Appendix A. The adjusted R^2 for this model increases from 0.340 in the initial model to 0.348 for our test of *MILPREP*, indicating a better model fit. However, *MILPREP* remains statistically insignificant (t = 0.316, Sig. 0.752), while the F-statistic continues to indicate that the specification has significant explanatory power (F = 95.950, Sig. < 0.0001). Therefore, M*ILPREP* is not a strategically important variable in the academic performance model when all midshipmen with valid AQPRs are included in the data set and will not be included in the alternate model specification. As a result, the alternate academic performance model specification (all midshipmen with valid AQPRs included) is:

$$AQPR = \alpha_0 + \beta_{MINORITY}MINORITY + \beta_{FEMALE}FEMALE + \beta_{MILFAM}MILFAM + \beta_{EorISTJ}EorISTJ + \beta_{SATmHI}SATmHI + \beta_{SATvHI}SATvHI + \beta_{CLASSRNK}CLASSRNK + \beta_{REC}REC + \beta_{COMPECA}COMPECA + \beta_{TIS}TIS$$

Finally, the same method is utilized to obtain an alternate specification for the military performance model (all valid MQPRs included). *MILFAM*, *SATvHI*, *COMPECA*, and *TIS* are found to be unimportant, and based on the initial model's results, are not statistically significant. Thus, they will not be included in the alternate model. However, *MILPREP* and *FEMALE*, despite being statistically insignificant, may be strategically important and require further analysis.

MILPREP and *FEMALE* are analyzed in a manner identical to that described above and the outcome of the regressions are displayed in Appendix A. The adjusted R^2 for this model increases from 0.185 in the initial model to 0.199. *MILPREP*, however, remains statistically insignificant (t = 0.976, Sig. 0.392), while the F-statistic continues to indicate that the specification has significant explanatory power (F = 54.997, Sig. < 0.0001). As a result, it is concluded that *MILPREP* is not an important variable and will be left out of the alternate specification.

When *FEMALE* is analyzed, the adjusted R^2 increases from 0.185 in the initial model to 0.199. *FEMALE* remains statistically insignificant (t = -1.340, Sig. 0.180), while the F-statistic continues to indicate that the model has significant explanatory power (F = 55.103, Sig. < 0.0001). Therefore, *FEMALE* is not strategically important and is left out of the alternate specification.

The resultant alternate specification for the military performance model (all midshipmen with valid MQPRs included) is:

$$MQPR = \alpha_0 + \beta_{MINORITY}MINORITY + \beta_{PRIORMIL}PRIORMIL + \beta_{RECRUIT}RECRUIT + \beta_{EorISTJ}EorISTJ + \beta_{SATmHI}SATmHI + \beta_{CLASSRNK}CLASSRNK + \beta_{REC}REC + \beta_{CIS}CIS.$$

4. Results of the Alternate Performance Models

a. Alternate Performance Model Results (Graduates-only)

The results of the alternate performance model specifications when only graduates are used in the analysis are displayed in Table 6.4. Both the academic and military performance models retain their explanatory power. In the academic performance model, all variables are statistically significant at the 0.06 level of significance or lower. The alternate model's adjusted R^2 does not change significantly from the initial model, indicating the model fit has not appreciably changed. With the exception of *FEMALE*, *MILFAM*, *COMPECA*, and *TIS* all coefficient signs are as predicted. When considered independently from the other variables and each other, *FEMALE*, *MILFAM*, *COMPECA*, and *TIS* have an effect opposite

from the predictions, which were based on theory and reasonable assumptions regarding these populations.

In the military performance model, *FEMALE* was the only variable that was not significant at the 0.10 level or lower. All other variables in the model (*MINORITY, RECRUIT, EorISTJ, SATmHI, SATvHI, CLASSRNK, REC, and CIS*) were significant at the 0.10 level or lower. The adjusted R^2 did not change. Only the coefficient signs of *FEMALE* and *RECRUIT* were not as predicted.

Table 6. 4 OLS Regression Parameter Estimates for Alternate Performance Models (Graduates-only)

	Academic Performance Model			**Military Performance Model**		
Variable	**Coefficient**	**t**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	.25881	1.438	.1507	**1.72303**	**15.286**	**.0000*** **
MINORITY	**-.15123**	**-6.297**	**.0000*** **	**-.10800**	**-5.992**	**.0000*** **
FEMALE	**-.04975**	**-1.915**	**.0557**	-.01849	-.964	.3353
MILFAM	**-.04229**	**-2.363**	**.0182**	-	-	-
PRIORMIL	**.06097**	**2.230**	**.0258**	-	-	-
RECRUIT	-	-	-	**.04831**	**3.044**	**.0024**
EorISTJ	**.04269**	**2.327**	**.0201**	**.04145**	**3.038**	**.0024**
SATmHI	**.00220**	**12.358**	**.0000*** **	**.00069**	**5.279**	**.0000*** **
SATvHI	**.00064**	**4.515**	**.0000*** **	**.00034**	**3.301**	**.0010**
CLASSRNK	**.00163**	**16.301**	**.0000*** **	**.00086**	**11.970**	**.0000*** **
REC	**.00030**	**2.640**	**.0084**	**.00026**	**3.092**	**.0020**
COMPECA	**-.00037**	**-2.739**	**.0062**	-	-	-
CIS	-	-	-	**.00012**	**1.700**	**.0892**
TIS	**-.00022**	**-2.173**	**.0299**	-	-	-
F-statistic	**93.634**	-	**.0000*** **	**52.334**	-	**.0000*** **
	n = 1810, Adjusted R^2 = 0.360			n = 1810, Adjusted R^2 = 0.203		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

b. Alternate Performance Model Results (All Valid AQPRs and MQPRs)

Table 6.5 shows the results of the alternate academic and military performance models when all midshipmen with valid AQPRs and MQPRs are included in the analysis. Both

models retain their explanatory power. All variables in the alternate academic performance model retain significance at the 0.06 level of significance or lower, and the model's adjusted R^2 does not change. With the exception *FEMALE*, *MILFAM*, *COMPECA*, and *TIS*, all coefficient signs are as predicted. When considered independently from the other variables and each other, *FEMALE*, *MILFAM*, *COMPECA*, and *TIS* have an effect opposite from the predictions, which were based on theory and reasonable assumptions regarding these populations.

CIS was the only variable in the alternate military performance model that did not remain significant at the 0.10 level or lower. All other variables were statistically significant at the 0.07 level of significance or lower. The alternate model's adjusted R^2 remains the same, indicating that the model's fit has not changed. *PRIORMIL* and *RECRUIT* are the only coefficients whose signs was not as predicted.

Table 6. 5 OLS Regression Parameter Estimates for Alternate Performance Models (All Valid AQPRs and MQPRs)

	Academic Performance Model			**Military Performance Model**		
Variable	**Coefficient**	**t**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	-.06787	-.363	.7166	**1.57732**	**11.845**	**.0000*** **
MINORITY	**-.19590**	**-7.707**	**.0000*** **	**-.15099**	**-7.478**	**.0000*** **
FEMALE	**-.05789**	**-2.050**	**.0405**	-	-	-
MILFAM	**-.03852**	**-1.959**	**.0503**	-	-	-
PRIORMIL	-	-	-	**-.05053**	**-2.258**	**.0240**
RECRUIT	-	-	-	**.04232**	**2.336**	**.0196**
EorISTJ	**.05428**	**2.696**	**.0071**	**.02946**	**1.852**	**.0642**
SATmHI	**.00231**	**12.237**	**.0000*** **	**.00087**	**6.073**	**.0000*** **
SATvHI	**.00057**	**3.676**	**.0002**	-	-	-
CLASSRNK	**.00174**	**16.392**	**.0000*** **	**.00092**	**10.977**	**.0000*** **
REC	**.00052**	**4.169**	**.0000*** **	**.00044**	**4.435**	**.0000*** **
COMPECA	**-.00036**	**-2.454**	**.0142**	-	-	-
CIS	-	-	-	.00012	1.472	.1411
TIS	**-.00028**	**-2.434**	**.0150**	-	-	-
F-statistic	**111.213**	-	**.0000*** **	**62.437**	-	**.0000*** **
	n = 2139, Adjusted R^2 = 0.340			n = 2172, Adjusted R^2 = 0.185		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

C. EFFECTS OF ATHLETIC PARTICIPATION ON THE PERFORMANCE MODEL

In the ensuing steps, athletic participation variables will be added to the performance models developed above to determine their effect. The effect of the following variables are evaluated (in order): *LTRWIN, VARSLTR* and *CLUBLTR, and TEAMSPRT* and *INDVSPRT*.

1. Effects of *LTRWIN*

a. Graduates-only Analysis

The effect of adding the variable *LTRWIN* to the academic and military performance models when using only graduates in the analysis is shown in Table 6.6. Both models retain their explanatory power. The addition of *LTRWIN* to the academic performance model does not significantly increase its goodness of fit (0.360 to 0.361). Also, *LTRWIN* is not statistically significant, indicating that winning a varsity or club sport letter has no predictive power in determining a midshipman's AQPR. In the military performance model, however, *LTRWIN* is statistically significant and increases the model fit from 0.203 to 0.217. The coefficient of *LTRWIN* is 0.08875, meaning that if all the other independent variables are held constant, earning a club sport letter, varsity letter, or both should increase a midshipman's *MQPR* by approximately 0.09.

The military performance model shows large changes in the significance of the variables *FEMALE* and *RECRUIT*. The change in *FEMALE* is most likely a result of the fact that females earn club sport and varsity letters at a rate higher than the USNA average. *RECRUIT*'s change in significance also stems, at least partially, from the fact that recruited athletes tend to earn letters at a rate higher than the USNA average (See Figure 6.11). However, multicollinearity has a more significant effect on *RECRUIT*, which is moderately correlated with *LTRWIN* (r = .368).

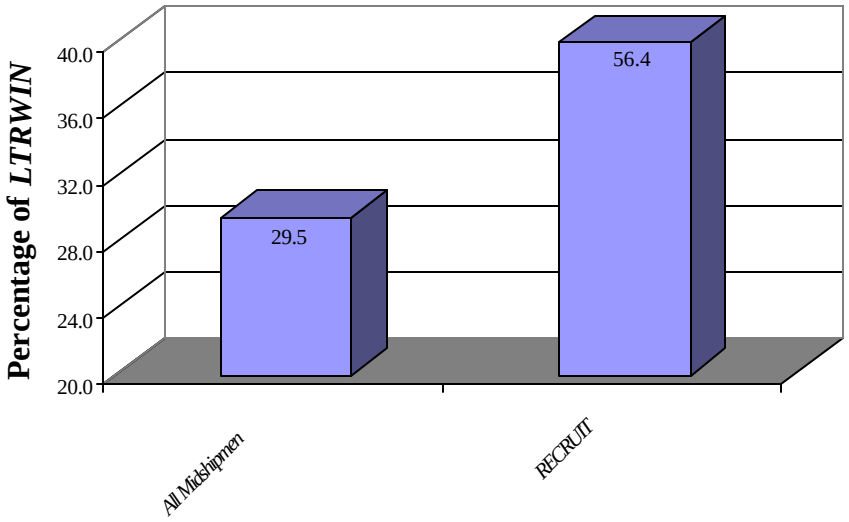
We can conclude from this analysis that when only graduates are considered, athletic participation as a function of earning a club sport letter, varsity letter, or both has a significant and positive effect on midshipmen military performance. We cannot determine the effect of winning a club sport letter, varsity letter, or both on academic performance.

Table 6. 6 OLS Parameter Estimates Showing the Effect of *LTRWIN* (Graduates-only)

	Academic Performance Model			**Military Performance Model**		
Variable	**Coefficient**	**T**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	.23119	1.275	.2025	**1.63595**	**14.509**	**.0000*** **
MINORITY	**-.14817**	**-6.140**	**.0000*** **	**-.10241**	**-5.724**	**.0000*** **
FEMALE	**-.05624**	**-2.124**	**.0338**	**-.03583**	**-1.861**	**.0629**
MILFAM	**-.04113**	**-2.296**	**.0218**	-	-	-
PRIORMIL	**.06110**	**2.236**	**.0255**	-	-	-
RECRUIT	-	-	-	.01793	1.080	.2801
EorISTJ	**.04332**	**2.361**	**.0183**	**.04264**	**3.153**	**.0016**
SATmHI	**.00222**	**12.423**	**.0000*** **	**.00072**	**5.606**	**.0000*** **
SATvHI	**.00066**	**4.584**	**.0000*** **	**.00036**	**3.551**	**.0004**
CLASSRNK	**.00165**	**16.349**	**.0000*** **	**.00088**	**12.380**	**.0000*** **
REC	**.00030**	**2.656**	**.0080**	**.00027**	**3.192**	**.0014**
COMPECA	**-.00038**	**-2.837**	**.0046**	-	-	-
CIS	-	-	-	**.00014**	**2.046**	**.0409**
TIS	**-.00023**	**-2.249**	**.0246**	-	-	-
LTRWIN	.02508	1.261	.2074	**.08875**	**5.743**	**.0000*** **
F-statistic	**85.992**	-	**.0000*** **	**51.236**	-	**.0000*** **
	n = 1810, Adjusted R^2 = 0.361			n = 1810, Adjusted R^2 = 0.217		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

Figure 6. 11 Percentage of *LTRWIN* for All Midshipmen and *RECRUIT*



b. All Valid AQPRs and MQPRs Analysis

The effect of adding the variable *LTRWIN* to the academic and military performance models when using all valid AQPRs and MQPRs in the analysis are shown in Table 6.7. Both models retain their explanatory power. The goodness of fit for the academic performance model increases slightly from 0.340 to 0.348. The variable of interest, *LTRWIN*, is statistically significant at less than .0001 and has a coefficient of 0.113, which means that holding constant the other independent variables, earning a club sport letter, varsity letter, or both is expected to increase AQPR by approximately 0.11 points.

The goodness of fit for the military performance model increases from 0.185 to 0.199. Once again, *LTRWIN* is statistically significant at .0001 and has a coefficient of 0.114, indicating that if all the other independent variables are held constant, earning a club sport letter, varsity letter or both should increase a midshipman's MQPR by approximately 0.11. The variable RECRUIT becomes insignificant due to multicollinearity with LTRWIN.

These results demonstrate that when all valid AQPRs and MQPRs are used in the analysis, athletic participation as a function of earning a club sport letter, varsity letter, or both has a significant and positive effect on both academic and military performance.

Table 6. 7 OLS Parameter Estimates Showing the Effect of *LTRWIN* (All Valid AQPRs and MQPRs)

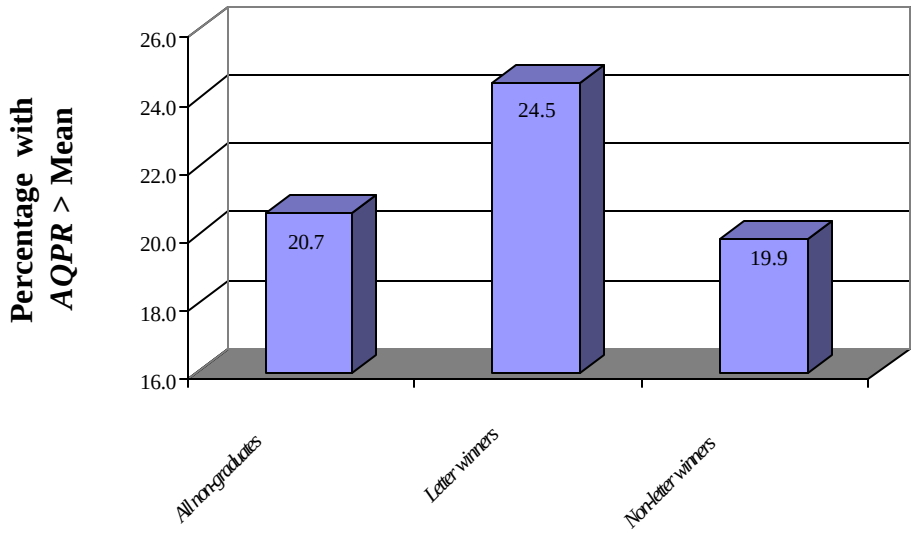
	Academic Performance Model			Military Performance Model		
Variable	**Coefficient**	**T**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	-.17813	-.952	.3412	**1.48881**	**11.219**	**.0000*****
MINORITY	**-.18203**	**-7.163**	**.0000*****	**-.14408**	**-7.190**	**.0000*****
FEMALE	**-.08446**	**-2.959**	**.0031**	-	-	-
MILFAM	**-.03333**	**-1.703**	**.0887**	-	-	-
PRIORMIL	-	-	-	**-.05076**	**-2.289**	**.0222**
RECRUIT	-	-	-	.00360	.190	.8495
EorISTJ	**.05665**	**2.830**	**.0047**	**.03022**	**1.917**	**.0554**
SATmHI	**.00241**	**12.783**	**.0000*****	**.00094**	**6.549**	**.0000*****
SATvHI	**.00061**	**3.970**	**.0001**	-	-	-
CLASSRNK	**.00178**	**16.839**	**.0000*****	**.00093**	**11.201**	**.0000*****
REC	**.00053**	**4.248**	**.0000*****	**.00044**	**4.511**	**.0000*****
COMPECA	**-.00041**	**-2.830**	**.0047**	-	-	-
CIS	-	-	-	**.00015**	**1.828**	**.0676**
TIS	**-.00031**	**-2.756**	**.0059**	-	-	-
LTRWIN	**.11319**	**5.137**	**.0000*****	**.11398**	**6.359**	**.0000*****
F-statistic	**104.708**	-	**.0000*****	**61.004**	-	**.0000*****
	n = 2139, Adjusted R^2 = 0.348			n = 2172, Adjusted R^2 = 0.199		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

Figure 6.12 may explain why letter winning is significant when the analysis includes all valid AQPRs but not when only graduates are considered. It appears that letter winners who did not graduate earned an above average AQPR more frequently (24.5 percent of the time) than their non-letter winning, non-graduate peers (only 19.9 percent of the time). Thus, at least as far as academic performance is concerned, a greater percentage of high performing letter winners leave the Naval Academy than do high performing non-letter winners. Although the percentage difference is most likely a result of the smaller total (graduates and non-graduates) number of high performing letter winners relative to the number of high performing non-letter winners, it is possible that the significance levels of the graduates-only analysis is affected since these midshipmen are excluded from the graduates-only analysis but included in the all valid AQPR analysis. Further examination of this percentage difference may be

appropriate using a larger number of classes. A similar effect should be observed when *LTRWIN* is replaced by *VARSLTR* and *CLUBLTR*.

Figure 6. 12 Non-graduates with AQPR > Mean



2. Effects of *VARSLTR* and *CLUBLTR*

The following analysis models club and varsity sport letter winners separately, instead of as the combined variable *LTRWIN,* in an attempt to determine if either variable has a significantly different effect.

a. Graduates-only Analysis

The effect of adding the variables *CLUBLTR* and *VARSLTR* when only graduates are used in the analysis is shown in Table 6.8. In the academic performance model, *CLUBLTR* and *VARSLTR* are not significant, indicating that winning a varsity or club sport letter has no predictive power in determining a midshipman's AQPR, even when considered independently. In the military performance model, both *CLUBLTR* and *VARSLTR* are significant and positive, indicating that winning a letter in either a club or varsity sport has the effect of increasing a midshipman's MQPR. Furthermore, based on the size of the coefficients,

winning a varsity letter has a greater positive effect on MQPR than does winning a club sport letter.

Table 6. 8 OLS Parameter Estimates Showing the Effect of *VARSLTR and CLUBLTR* (Graduates-only)

Variable	Academic Performance Model			Military Performance Model		
	Coefficient	**T**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	.23926	1.314	.1891	**1.63353**	**14.459**	**.0000*** **
MINORITY	**-.14876**	**-6.152**	**.0000*** **	**-.10186**	**-5.688**	**.0000*** **
FEMALE	**-.05609**	**-2.116**	**.0345**	**-.03515**	**-1.823**	**.0685**
MILFAM	**-.04117**	**-2.297**	**.0217**	-	-	-
PRIORMIL	**.06097**	**2.229**	**.0259**	-	-	-
RECRUIT	-	-	-	.01534	.901	.3676
EorISTJ	**.04306**	**2.344**	**.0192**	**.04323**	**3.193**	**.0014**
SATmHI	**.00222**	**12.344**	**.0000*** **	**.00072**	**5.600**	**.0000*** **
SATvHI	**.00065**	**4.550**	**.0000*** **	**.00037**	**3.590**	**.0003**
CLASSRNK	**.00164**	**16.316**	**.0000*** **	**.00088**	**12.381**	**.0000*** **
REC	**.00030**	**2.653**	**.0080**	**.00027**	**3.209**	**.0014**
COMPECA	**-.00038**	**-2.837**	**.0046**	-	-	-
CIS	-	-	-	**.00014**	**2.015**	**.0440**
TIS	**-.00023**	**-2.234**	**.0256**	-	-	-
CLUBLTR	.03131	.984	.3252	**.07035**	**2.994**	**.0028**
VARSLTR	.01956	.887	.3752	**.09256**	**5.277**	**.0000*** **
F-statistic	**79.324**	-	**.0000*** **	**46.518**	-	**.0000*** **
	n = 1810, Adjusted R^2 = 0.360			n = 1810, Adjusted R^2 = 0.217		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

b. All Valid AQPRs and MQPRs Analysis

Table 6.9 shows the effect of adding the variables *CLUBLTR* and *VARSLTR* to the academic and military performance models when using all valid AQPRs and MQPRs in the analysis. In both the academic and military performance models, *CLUBLTR* and *VARSLTR* are significant and positive, indicating that winning a letter in either a club or varsity sport has the effect of increasing a midshipman's AQPR and MQPR. Moreover, the size of the coefficients

indicate that winning a letter in a varsity sport is associated with a greater increase in both AQPR and MQPR than if a letter is won in a club sport.

Table 6. 9 OLS Parameter Estimates Showing the Effect of *VARSLTR and CLUBLTR* (All Valid AQPRs and MQPRs)

	Academic Performance Model			**Military Performance Model**		
Variable	**Coefficient**	**T**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	-.17304	-.921	.3569	**1.48706**	**11.193**	**.0000*** **
MINORITY	**-.18195**	**-7.143**	**.0000*** **	**-.14377**	**-7.170**	**.0000*** **
FEMALE	**-.08414**	**-2.944**	**.0033**	-	-	-
MILFAM	**-.03312**	**-1.691**	**.0910**	-	-	-
PRIORMIL	-	-	-	**-.05008**	**-2.257**	**.0241**
RECRUIT	-	-	-	.00092	.047	.9622
EorISTJ	**.05680**	**2.833**	**.0047**	**.03087**	**1.957**	**.0505**
SATmHI	**.00241**	**12.712**	**.0000*** **	**.00094**	**6.555**	**.0000*** **
SATvHI	**.00061**	**3.970**	**.0001**	-	-	-
CLASSRNK	**.00178**	**16.826**	**.0000*** **	**.00094**	**11.222**	**.0000*** **
REC	**.00053**	**4.252**	**.0000*** **	**.00044**	**4.520**	**.0000*** **
COMPECA	**-.00042**	**-2.853**	**.0044**	-	-	-
CIS	-	-	-	**.00014**	**1.794**	**.0729**
TIS	**-.00031**	**-2.754**	**.0059**	-	-	-
CLUBLTR	**.10677**	**2.934**	**.0034**	**.09358**	**3.300**	**.0010**
VARSLTR	**.10958**	**4.480**	**.0000*** **	**.11775**	**5.746**	**.0000*** **
F-statistic	**95.824**	-	**.0000*** **	**54.823**	-	**.0000*** **
	n = 2139, Adjusted R^2 = 0.347			n = 2172, Adjusted R^2 = 0.199		

3. Effects of *TEAMSPRT* and *INDVSPRT*

In the following analysis, *TEAMSPRT* and *INDVSPRT* are added to analyze the effect on academic and military performance of sports that require team performance, such as football, versus sports that require individual performance, such as boxing.

a. Graduates-only Analysis

Table 6.10 shows the effect of adding *TEAMSPRT* and *INDVSPR*T when only graduates are used in the analysis. In the academic performance model, *INDVSPRT* is significant and positive; indicating that participating in an individual sport can be associated with

a higher AQPR for a given midshipman. *TEAMSPRT*, however, is not significant and we cannot determine its effect. In the military performance model, both *TEAMSPRT* and *INDVSPRT* are significant and positive, indicating that winning a letter in either a team or individual sport has the effect of increasing the MQPR of a given midshipman. Furthermore, based on a comparison of the size of the coefficients, winning a letter in an individual sport has more value in terms of MQPR increase than does winning a letter in a team sport.

Table 6. 10 OLS Parameter Estimates Showing the Effect of *TEAMSPRT and INDVSPRT* (Graduates-only)

Variable	Academic Performance Model			Military Performance Model		
	Coefficient	**T**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	.22728	1.254	.2099	**1.65727**	**14.707**	**.0000*** **
MINORITY	**-.14886**	**-6.172**	**.0000*** **	**-.10375**	**-5.806**	**.0000*** **
FEMALE	**-.06178**	**-2.316**	**.0207**	**-.04312**	**-2.224**	**.0263**
MILFAM	**-.04166**	**-2.327**	**.0201**	-	-	-
PRIORMIL	**.06142**	**2.249**	**.0246**	-	-	-
RECRUIT	-	-	-	.01730	1.043	.2970
EorISTJ	**.04359**	**2.377**	**.0176**	**.04367**	**3.233**	**.0012**
SATmHI	**.00222**	**12.439**	**.0000*** **	**.00072**	**5.607**	**.0000*** **
SATvHI	**.00064**	**4.496**	**.0000*** **	**.00035**	**3.394**	**.0007**
CLASSRNK	**.00164**	**16.247**	**.0000*** **	**.00087**	**12.293**	**.0000*** **
REC	**.00030**	**2.659**	**.0079**	**.00027**	**3.224**	**.0013**
COMPECA	**-.00036**	**-2.617**	**.0089**	-	-	-
CIS	-	-	-	**.00013**	**1.843**	**.0655**
TIS	**-.00023**	**-2.202**	**.0278**	-	-	-
TEAMSPRT	-.00185	-.080	.9359	**.05858**	**3.349**	**.0008**
INDVSPRT	**.06238**	**2.172**	**.0300**	**.13278**	**6.075**	**.0000*** **
F-statistic	**79.747**	**-**	**.0000*** **	**47.392**	**-**	**.0000*** **
	n = 1810, Adjusted R^2 = 0.361			n = 1810, Adjusted R^2 = 0.220		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

b. All Valid AQPRs and MQPRs Analysis

The effect of adding *TEAMSPRT* and *INDVSPRT* when all valid AQPRs and MQPRs are used in the analysis is shown in Table 6.11. In both the academic and military

performance models *TEAMSPRT* and *INDVSPRT* are significant and positive indicating that participating on either a team or individual sport has the effect of increasing a midshipman's AQPR and MQPR. Additionally, based on the size of the coefficients, it appears that winning a letter in an individual sport has a greater positive effect on a midshipman's AQPR and MQPR than winning a letter in a team sport.

Table 6. 11 OLS Parameter Estimates Showing the Effect of *TEAMSPRT and INDVSPRT* (All Valid AQPRs and MQPRs)

	Academic Performance Model			**Military Performance Model**		
Variable	**Coefficient**	**T**	**Significance**	**Coefficient**	**t**	**Significance**
Constant	-.17812	-.951	.3415	**1.49754**	**11.282**	**.0000*** **
MINORITY	**-.18269**	**-7.187**	**.0000*** **	**-.14490**	**-7.230**	**.0000*** **
FEMALE	**-.08685**	**-3.021**	**.0026**	-	-	-
MILFAM	**-.03378**	**-1.725**	**.0847**	-	-	-
PRIORMIL	-	-	-	**-.05036**	**-2.271**	**.0233**
RECRUIT	-	-	-	.00353	.186	.8523
EorISTJ	**.05704**	**2.848**	**.0044**	**.03114**	**1.975**	**.0484**
SATmHI	**.00241**	**12.768**	**.0000*** **	**.00093**	**6.544**	**.0000*** **
SATvHI	**.00061**	**3.931**	**.0001**	-	-	-
CLASSRNK	**.00178**	**16.763**	**.0000*** **	**.00093**	**11.085**	**.0000*** **
REC	**.00053**	**4.255**	**.0000*** **	**.00044**	**4.524**	**.0000*** **
COMPECA	**-.00040**	**-2.733**	**.0063**	-	-	-
CIS	-	-	-	**.00014**	**1.727**	**.0843**
TIS	**-.00031**	**-2.731**	**.0064**	-	-	-
TEAMSPRT	**.09570**	**3.718**	**.0002**	**.09197**	**4.436**	**.0000*** **
INDVSPRT	**.12969**	**4.055**	**.0001**	**.13993**	**5.515**	**.0000*** **
F-statistic	**95.836**	-	**.0000*** **	**54.981**	-	**.0000*** **
	n = 2139, Adjusted R^2 = 0.347			n = 2172, Adjusted R^2 = 0.199		

Note: **Bold** indicates significance lower than .10 (two-tailed test)
******* Significance lower than .0001

VII. CONCLUSIONS AND RECOMMENDATIONS

This study investigated the effect of the United States Naval Academy's varsity and club sport athletic programs on midshipmen academic and military performance. Specifically, it highlighted the impact of significant participation in these programs, as characterized by earning either a varsity and/or club sport letter, on a midshipman's Academic Quality Point Rating (AQPR) and Military Quality Point Rating (MQPR).[5] While it is easily accepted that these athletic programs, along with strong intramural and physical readiness testing programs, are essential to the physical development portion of the Naval Academy mission, their effect on the moral and mental development portions of the mission were less clear and are widely disputed. This chapter will summarize the findings, offer policy recommendations, and make recommendations for additional research.

A. CONCLUSIONS

Two separate sets of academic and military performance analyses were conducted. The first analysis used a data set containing graduates-only. The second used a data set containing all midshipmen with valid AQPRs and MQPRS. Table 6.12 summarizes the OLS parameter estimates of the variables of interest in the academic and military performance models for both analyses.

[5] Again, the AQPR is the cumulative grade point average for all of a midshipman's academic courses and the MQPR is the cumulative grade point average in all areas effected by military principles, such as professional courses, physical education, athletic performance, military performance, and conduct.

Table 6. 12 Summary of OLS Parameters for Primary Variables of Interest

Variable	AQPR				MQPR			
	Graduates-only		All Valid		Graduates-only		All Valid	
	Coeff.	Signif.	Coeff.	Signif.	Coeff.	Signif.	Coeff.	Signif.
LTRWIN	.02508	.2074	**.11319**	**.0000**	**.08875**	**.0000**	**.11398**	**.0010**
CLUBLTR	.03131	.3252	**.10677**	**.0034**	**.07035**	**.0028**	**.09358**	**.0010**
VARSLTR	.01956	.3752	**.10958**	**.0000**	**.09256**	**.0000**	**.11775**	**.0000**
TEAMSPRT	-.00185	.9359	**.09570**	**.0002**	**.05858**	**.0008**	**.09197**	**.0000**
INDVSPRT	**.06238**	**.0300**	**.12969**	**.0001**	**.13278**	**.0000**	**.13993**	**.0000**
Note: **Bold** indicates significance lower than .10 (two-tailed test)								

For the graduate only analysis, only *INDVSPRT* had a significant and positive effect on AQPR. MQPR, on the other hand, was positively affected by all the variables of interest, although *VARSLTR* had a slightly greater effect than *CLUBLTR*, and *INDVSPRT* had a greater effect than *TEAMSPRT*.

When all valid AQPRs and MQPRs are used in the analysis, all the variables of interest have a positive effect on both AQPR and MQPR. The hierarchies in both the AQPR and MQPR models are similar to the MQPR model graduates-only analysis, where *VARSLTR* has a greater effect than *CLUBLTR* and *INDVSPRT* has a greater effect than *TEAMSPRT*.

The disparity between the results for the graduate only analysis and the all valid AQPRs and MQPRs analysis is noteworthy. While it is the case in this dataset that those letter winners who did not graduate more frequently have above average AQPRs than their non-letter winning, non-graduate peers, this may be do to the small number of relevant cases in the two classes examined and further analysis using additional classes is warranted.

Thus, the following conclusions may be drawn concerning the effect of athletic participation on academic and military performance. In terms of military performance, there is now sufficient evidence that the maturity, stamina, aggressiveness, goal achievement, etc. that are learned on the athletic field are carried *off* the field and put to use in other venues at the Naval Academy. In terms of academic performance, however, the results are less clear. While

there is some evidence that the lessons of the athletic field are carried into the classroom in the all valid AQPR analyses, we cannot conclude that athletic participation for graduates has any effect on academic performance, with the exception of participation on a sports team classified as an individual sport.[6]

B. FUTURE RESEARCH RECOMMENDATIONS

Several interesting ideas for future research have presented themselves during the course of this analysis. For example, since the sample size of this study was restricted due to the availability of data, a similar analysis might be performed in the future that utilizes the data from five to ten classes of graduated midshipmen. This would allow a more complete analysis of the average effect and would provide sufficient sample size to perform more in-depth probing of specific populations such as minorities and females. For these smaller subsets of the Brigade of Midshipmen, athletic programs may have significantly different effect than they do for the more typical Caucasian male midshipman. Most importantly, such a study might also analyze the academic and military performance consequences of being on specific teams. This would allow an objective examination of whether, as the literature review suggests, the focus on winning in high visibility, revenue producing sports negatively affects the student-athlete.

Future research might also evaluate the effect of the Naval Academy's athletic programs on midshipmen attrition. Such a study might closely examine whether "belongingness" needs are met through participation in club or varsity sport teams, causing a decrease in voluntarily attrition among athletes. Furthermore, it would be interesting to investigate the interaction between both academic and military performance and attrition among athletes and non-athletes, especially since it appears from the above analyses that letter winners who did not graduate are more likely to have above average AQPRs that their non-letter winning, non-graduating peers.

Finally, the population of midshipmen that did not graduate provides another opportunity to shed light on the dynamics at work within the Brigade of Midshipmen. The

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[6] Table 5.3 identifies which sports were classified as team sports and which sports were classified as

challenge of research in this area would be the availability of data, as it is not clear that any significant data is collected from midshipmen as they depart the Naval Academy. Future research in this area might concentrate on predicting which midshipmen are likely to leave either voluntarily or non-voluntarily and devising intervention strategies to prevent this loss and protect taxpayer investment. Strong varsity and club sport athletic programs may be one way to do this. Additionally, the question of whether proportionately more high performing varsity letter winners leave than do high performing non-varsity letter winners should be thoroughly investigated.

C. SUMMARY

Sufficient evidence exists to suggest that the United States Naval Academy should continue to foster strong varsity and club sport athletic programs. Beyond the officer-like qualities that are directly taught on the athletic field, significant participation in these programs does enhance the military performance of midshipman. There is also some evidence to suggest that performance in the classroom may benefit as well.

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individual sports.

APPENDIX A. PERFORMANCE MODEL OLS REGRESSION RESULTS

A. *MILPREP*'S EFFECT ON ALTERNATE *AQPR* SPECIFICATION

1. Graduates-only

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.605[a]	.366	.361	.3778

a. Predictors: (Constant), LTRWIN, TIS, MINORITY, MILFAM, REC, EORISTJ, COMPECA, MILPREP, FEMALE, SATVHI, CLASSRNK, SATMHI, PRIORMIL

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	147.732	13	11.364	79.627	.000[a]
	Residual	256.315	1796	.143		
	Total	404.047	1809			

a. Predictors: (Constant), LTRWIN, TIS, MINORITY, MILFAM, REC, EORISTJ, COMPECA, MILPREP, FEMALE, SATVHI, CLASSRNK, SATMHI, PRIORMIL

b. Dependent Variable: AQPR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.306	.188		1.634	.103
	MINORITY	-.148	.024	-.123	-6.144	.000
	FEMALE	-5.88E-02	.027	-.045	-2.216	.027
	MILFAM	-4.15E-02	.018	-.044	-2.317	.021
	PRIORMIL	8.921E-02	.033	.073	2.726	.006
	MILPREP	-4.82E-02	.031	-.042	-1.559	.119
	EORISTJ	4.402E-02	.018	.046	2.399	.017
	SATMHI	2.161E-03	.000	.281	11.786	.000
	SATVHI	6.534E-04	.000	.104	4.571	.000
	CLASSRNK	1.623E-03	.000	.359	15.973	.000
	REC	2.865E-04	.000	.049	2.493	.013
	COMPECA	-3.78E-04	.000	-.056	-2.788	.005
	TIS	-2.38E-04	.000	-.047	-2.315	.021
	LTRWIN	2.692E-02	.020	.027	1.352	.177

a. Dependent Variable: AQPR

2. All Valid *AQPR*s

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.593[a]	.351	.348	.4490

a. Predictors: (Constant), LTRWIN, TIS, MILFAM, MINORITY, REC, EORISTJ, COMPECA, MILPREP, FEMALE, SATVHI, CLASSRNK, SATMHI

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	232.155	12	19.346	95.950	.000[a]
	Residual	428.664	2126	.202		
	Total	660.819	2138			

a. Predictors: (Constant), LTRWIN, TIS, MILFAM, MINORITY, REC, EORISTJ, COMPECA, MILPREP, FEMALE, SATVHI, CLASSRNK, SATMHI

b. Dependent Variable: AQPR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.202	.202		-1.001	.317
	MINORITY	-.183	.025	-.133	-7.167	.000
	FEMALE	-8.38E-02	.029	-.054	-2.927	.003
	MILFAM	-3.34E-02	.020	-.030	-1.706	.088
	MILPREP	8.765E-03	.028	.007	.316	.752
	EORISTJ	5.693E-02	.020	.050	2.841	.005
	SATMHI	2.429E-03	.000	.277	12.332	.000
	SATVHI	6.192E-04	.000	.084	3.978	.000
	CLASSRNK	1.791E-03	.000	.337	16.336	.000
	REC	5.254E-04	.000	.077	4.244	.000
	COMPECA	-4.10E-04	.000	-.052	-2.817	.005
	TIS	-3.09E-04	.000	-.052	-2.731	.006
	LTRWIN	.113	.022	.093	5.119	.000

a. Dependent Variable: AQPR

B. *MILPREP*'S EFFECT ON ALTERNATE *MQPR* SPECIFICATION

1. Graduates-only

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.469[a]	.220	.216	.2796

a. Predictors: (Constant), LTRWIN, EORISTJ, REC, MINORITY, CIS, MILPREP, SATVHI, RECRUIT, CLASSRNK, SATMHI

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.739	10	3.974	50.819	.000[a]
	Residual	140.678	1799	7.820E-02		
	Total	180.417	1809			

a. Predictors: (Constant), LTRWIN, EORISTJ, REC, MINORITY, CIS, MILPREP, SATVHI, RECRUIT, CLASSRNK, SATMHI

b. Dependent Variable: MQPR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.660	.124		13.396	.000
	MINORITY	-.103	.018	-.127	-5.724	.000
	MILPREP	-8.74E-03	.019	-.011	-.459	.646
	RECRUIT	1.593E-02	.017	.023	.958	.338
	EORISTJ	4.274E-02	.014	.067	3.155	.002
	SATMHI	7.291E-04	.000	.142	5.418	.000
	SATVHI	3.376E-04	.000	.080	3.303	.001
	CLASSRNK	8.469E-04	.000	.280	11.631	.000
	REC	2.665E-04	.000	.069	3.181	.001
	CIS	1.523E-04	.000	.046	2.163	.031
	LTRWIN	8.455E-02	.015	.126	5.530	.000

a. Dependent Variable: MQPR

2. All Valid *MQPR*s

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.450[a]	.203	.199	.3537

a. Predictors: (Constant), LTRWIN, EORISTJ, REC, MINORITY, CIS, MILPREP, RECRUIT, CLASSRNK, SATMHI, PRIORMIL

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.452	.138		10.515	.000
	MINORITY	-.144	.020	-.148	-7.181	.000
	PRIORMIL	-6.68E-02	.028	-.068	-2.419	.016
	MILPREP	2.593E-02	.027	.028	.976	.329
	RECRUIT	3.607E-03	.019	.004	.190	.849
	EORISTJ	2.984E-02	.016	.037	1.893	.059
	SATMHI	9.649E-04	.000	.154	6.608	.000
	CLASSRNK	9.457E-04	.000	.251	11.223	.000
	REC	4.473E-04	.000	.092	4.579	.000
	CIS	1.494E-04	.000	.036	1.853	.064
	LTRWIN	.113	.018	.131	6.300	.000

a. Dependent Variable: MQPR

C. *FEMALE*'S EFFECT ON ALTERNATE (*MQPR*) SPECIFICATION

1. Graduates-only

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.471[a]	.222	.217	.2794

a. Predictors: (Constant), LTRWIN, EORISTJ, REC, MINORITY, FEMALE, CIS, SATVHI, CLASSRNK, RECRUIT, SATMHI

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.993	10	3.999	51.236	.000[a]
	Residual	140.424	1799	7.806E-02		
	Total	180.417	1809			

a. Predictors: (Constant), LTRWIN, EORISTJ, REC, MINORITY, FEMALE, CIS, SATVHI, CLASSRNK, RECRUIT, SATMHI

b. Dependent Variable: MQPR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.636	.113		14.509	.000
	MINORITY	-.102	.018	-.127	-5.724	.000
	FEMALE	-3.58E-02	.019	-.041	-1.861	.063
	RECRUIT	1.793E-02	.017	.025	1.080	.280
	EORISTJ	4.264E-02	.014	.066	3.153	.002
	SATMHI	7.220E-04	.000	.141	5.606	.000
	SATVHI	3.621E-04	.000	.086	3.551	.000
	CLASSRNK	8.814E-04	.000	.292	12.380	.000
	REC	2.671E-04	.000	.069	3.192	.001
	CIS	1.442E-04	.000	.044	2.046	.041
	LTRWIN	8.875E-02	.015	.132	5.743	.000

a. Dependent Variable: MQPR

2. All Valid *MQPR*s

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.451[a]	.203	.199	.3536

a. Predictors: (Constant), LTRWIN, EORISTJ, REC, MINORITY, FEMALE, CIS, PRIORMIL, RECRUIT, CLASSRNK, SATMHI

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	68.897	10	6.890	55.103	.000[a]
	Residual	270.196	2161	.125		
	Total	339.093	2171			

a. Predictors: (Constant), LTRWIN, EORISTJ, REC, MINORITY, FEMALE, CIS, PRIORMIL, RECRUIT, CLASSRNK, SATMHI

b. Dependent Variable: MQPR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.497	.133		11.270	.000
	MINORITY	-.144	.020	-.148	-7.185	.000
	FEMALE	-2.93E-02	.022	-.027	-1.340	.180
	PRIORMIL	-5.29E-02	.022	-.054	-2.379	.017
	RECRUIT	4.191E-03	.019	.005	.221	.825
	EORISTJ	2.988E-02	.016	.037	1.896	.058
	SATMHI	9.150E-04	.000	.146	6.374	.000
	CLASSRNK	9.509E-04	.000	.252	11.276	.000
	REC	4.434E-04	.000	.091	4.554	.000
	CIS	1.381E-04	.000	.034	1.707	.088
	LTRWIN	.117	.018	.136	6.485	.000

a. Dependent Variable: MQPR

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